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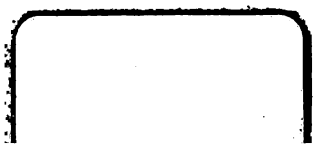

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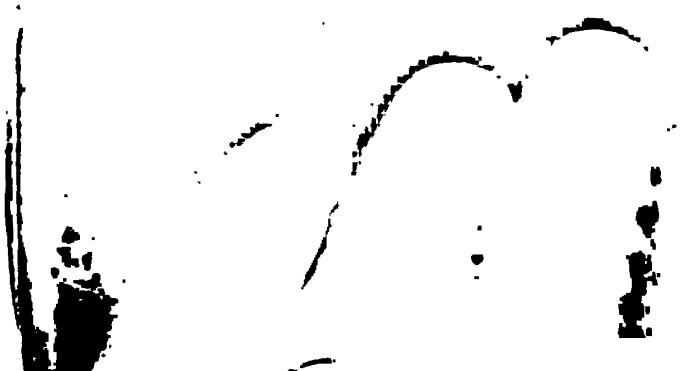

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Index of Volume XXXIX

	PAGE
Abrasives, Increased Production of	229
Accidents in Quarry Operations	269
Air Hammer and Health, The	224
Alabama's Oolitic Limestone	172
Albany, A State Office Building at	26
American Marble in Porto Rico, Illustrated	322
American Operation of French Quarries	123
America's Slate Production	372
Antique Sculptures, High Prices for	229
Arch, A Circle-on-Circle, Illustrated	471
Architects and Advertising	365
Architects and Contractors	420
Architectural League Exhibition, The	87
Argentina, Ancient Stonework in	370
Argentina, Building Stone in	132
Argentine Mica Industry	414
Army Building Plan, Great	133
Artificial Stone in a Monumental Building, Illustrated	171
Artistic Church Stonework, Illustrated	33
Asbestos, Canadian	268
Asbestos Industry of Russia	76
Asbestos Production Increasing	320
Australian Stone Used in London	460
Bedford Stone Club Joins National Chamber	87
Blasting Stone by Electricity	223
Bluestone, Methods of Quarrying	366
Bluestone Production Decreased	279
Build Again, When We	505
Builders to Help in the War	328
Building and War-Time Economy	176
Building by Time Table	121
Building Conditions, Survey of	180
Building Costs Two Hundred Years Ago	184
Building During the War	519
Building Embargo Lifted	516
Building, Granite for	409
Building Industries Alive, Keeping the	457
Building Industries, National Federation of	363
Building Industries Organize	128
Building Material for Halifax	30
Building Material in French Morocco	122
Building Material Wholesale, Buying	410
Building Materials in Honduras	77
Building Materials, Stone the Noblest of	78
Building Materials to Cost More	365
Building Needs Imperative in New York	362
Building Operations in 1917	377
Building Operations in Leading Cities	231
Building Outlook More Hopeful	329
Building Picking Up in Canada	370
Building Plan, Great Army	133
Building Revival Coming Soon	315
Building Stone, A Lecture on	32
Building Stone in Argentina	132
Building Stone Industry, War and the	411
Building Stone in Jerusalem	183
Building Stone, War Service Committee on	362
Building Trade Restrictions in Great Britain	376
Building Trades and the War	280
Building Work Already Planned, Much	557
Burma, Jade and Granite in	136
California's State Building	316
Canada's Greatest Stone Building, Illustrated	511
Canada, Stone and Slate in	74
Care in Highway Maintenance	131
Carthage Limestone and Marble	228
Cathedrals, Stonework in the French	466
Chinese Stone Cutters, Illustrated	518
Church Stonework, Artistic, Illustrated	33
Circle-on-Circle Arch, A, Illustrated	471
Clay Products Restricted, Making of	227
Close Mitering Slates, Illustrated	521
Colorado-Yule Properties, Fighting Over	518
Colorado-Yule Property, The	462
Compressed Air Definitions	329
Concrete Collapse, Another	35
Concrete Collapse, Three Killed in	85
Concrete Construction and Fire Loss	127
Concrete Stone, Unsightly Cracks in	132
Construction, Curtailment of	365
Contractors, Architects and	420
Contractors, Credit Purchased by	361
Copenhagen, Building Activities in	520
Corner Stone Lost, Historic	28
Courthouse, King's County, Illustrated	459
Credit Purchases by Contractors	361
Crushed Stone, The Government Need for	124
Crushed Stone Plants May Close	461
Crushing, Stone Suitable for	174
Cut Stone Cheaper than Terra Cotta	423
Cut Stone Constractors Organize	183
Cutting Stone by Machinery	169
Danby Cliff-Workers, The, Illustrated	21
Designers and Craftsmen, Helps for	517
Dublin, Natural Stone Wins Out in	34
Duties on Carved Stone	563
Duty on Finished Marble Work, Ask for	128
Electricity, Blasting Stone by	223
Embargo on Building Lifted, The	516
England, Stone Barn of	271
Feldspar Quarries in Ontario	229
Fire Loss, Concrete Construction and	127
Flint Pebbles Produced in This Country	369
Flux, Marked Gain in Limestone for	416
Fountains in America, Illustrated	29
France, Rebuilding, After the War	184
French Cathedrals, Stonework in the	466
French Morocco, Building Materials in	122
French Quarries, American Operation of	123
Ganister Production in the United States	25
Ganister Quarrying Industry, Growth of	374
Germany, Housing Problem in	329
Government's Attitude Toward Building	173
Government May Halt Work	470
Granite for Building	409
Granite for Highways, Favor	89
Granite for Paving	267
Granite in Burma, Jade and	136
Granite in Maine, Production of	28
Granite Nations, The	81
Granite Paving Block Industry	317
Granite Production of New Hampshire	130
Granite State, Wisconsin as a	34
Granite Trade Abroad, The	460
Granites in Ireland, Good	509
Granites of Texas, Illustrated	129
Graphite from Madagascar	418
Graphite Needed for War Work	275
Great Britain, Building Restrictions in	376
Great Building Programme, A	73
Gypsum, Rock, Quarrying of	178
Halifax, Building Material for	30
Hardness and Strength of Stone	278
Highway Maintenance Imperative	410
Honduras, Building Materials in	77
House Plans, Prizes for Small	320
Houses, New, in New York and Vicinity	84
Indiana Building Stone	271
Indiana Limestone and Its Use	82
Indiana Limestone and the War	221
Indiana Oolitic Limestone in 1917	219
Ireland, Good Granites in	509
Irish Granite Industry, The	39
Irish Marbles	371
Italian Marble Production, Decreased	419
Italian Quarries Still Active	553
Italy, Stone Houses in	232
Jade and Granite in Burma	136
Jade in Burmah	556

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STONE

PAGE

Japanese Lovers of Unhewn Stones ... 79
Jerusalem, Building Stone in ... 183

King's County Courthouse, Illustrated ... 459

Labor Saving in Limestone Quarrying, II, by Oliver Bowles ... 560
Law Points on Building, Pertinent ... 413
Ledge-Stone in Building, Use of ... 124
Liberty Loan, The Fourth ... 468
Lime, Less, But Higher Prices ... 510
Lime Production and Quarry Waste ... 24
Limestone, Alabama's Oolitic ... 172
Limestone and Marble, Carthage ... 228
Limestone and Onyx Caves ... 418
Limestone, Indiana, and Its Use ... 82
Limestone, Indiana, and the War ... 221
Limestone, Indiana Oolitic, in 1917 ... 219
Limestone for Flux, Gains in ... 416
Limestone for Nitrate Plants ... 226
Limestone Men Protest Switching Charges ... 370
Limestone, Pulverized, for Agricultural Use ... 20
Limestone, The Story of ... 507
Limestone Turned to Phosphate Rock ... 472
Limestone Quarrying, Labor Saving in, Part I, by Oliver Bowles ... 513
Lithographic Stone, Domestic ... 180
London, Australian Stone Used in ... 460

Machinery, Cutting Stone by ... 169
Maine Granite, Production of ... 28
Marble, American, in Porto Rico, Illustrated ... 322
Marble, Carthage Limestone and ... 228
Marble Caves of Oregon, The ... 413
Marble Dealers, Meeting of ... 89
Marble, Fine Music Building of ... 38
Marble in the United States, Production of ... 38
Marble on the Wingdale Prison Site ... 84
Marble Property, The Colorado-Yule ... 462
Marble Quarrying on Danby Mountain, Illustrated ... 21
Marble Row, The Passing of ... 85
Marble, The Quarrying of ... 218
Marble Work, Ask for Duty on ... 128
Marble Work in Saint Sofia ... 172
Marbles, Irish ... 371
Marbles of Michigan ... 554
Marbles, Shipments of Foreign ... 183
Marl Production Increased ... 417
Masonry, The Greatest Works in ... 35
Mausoleum, Unusual Features in, Illustrated ... 519
Memorial Arch in New York, As to a ... 564
Memorial for War Heroes, A Noble ... 413
Mica an Important War Material ... 321
Mica Industry, Argentine ... 414
Mica Schist for Furnace Linings ... 323
Michigan, Marbles of ... 554
Millstones Coming Into Use Again ... 554
Mineral Wealth, Our Great ... 37
Mineral Wool from Stone, Making ... 81
Missouri Offers in Stone, What ... 415
Montreal, Building in ... 220
Monumental Art in Stone, Illustrated ... 276
Motor Trucks in Stone Service ... 328
Municipal Building, New York, Artificial Stone in, Illustrated ... 171

National Federation of Building Industries ... 363
Native Stone, Washington's Capitol and ... 19
Natural Stone Wins Out in Dublin ... 34
New Hampshire, Granite Production of ... 130
New York, Building Needs Imperative in ... 362
New York Municipal Building, Artificial Stone in, Illustrated ... 171
"Non-Essential" Industries, What are ... 135

Oilstone and Whetstones ... 509
Oklahoma State Capitol, The, Illustrated ... 122
Onyx Caves, Limestone and ... 418
Oregon, The Marble Caves of ... 413
Ottawa, New Government Building at ... 218

Palace, Alterations to a Famous ... 170
Palermo, Building Stone in ... 506
Paving Block Industry, Granite ... 317

PAGE

Paving, Granite for ... 267
Peace, Speaking of ... 470
Pennsylvania, Slate Producers in ... 38
Pennsylvania, Stone Houses of ... 273
Pentelikon Marble, Antique Statue of ... 170
Philadelphia Library, Stonework for ... 506
Phosphate Rock, Limestone Turned to ... 492
Plaster of Paris for Art and Other Work ... 275
Porto Rico, American Marble in, Illustrated ... 322
Post Office Construction, Big Programme of ... 566
Potash in America, Sources of ... 463
Power Plant Efficiency, To Investigate ... 331
Pumice Stone, Domestic Sources of ... 467
Pumps for Quarry Service, Illustrated ... 272

Quarries, American Troops Quartered in ... 179
Quarries Still Active, Italian ... 553
Quarrying Bluestone, Methods of ... 366
Quarrying of Marble, The ... 218
Quarrying of Phosphate Rock ... 274
Quarrying of Rock Gypsum ... 178
Quarry Blast Like Warfare, A ... 88
Quarry Equipment, A Big ... 77
Quarry Operations, Accidents in ... 269
Quarry Products in Great Britain ... 176
Quarry Service, Pumps for, Illustrated ... 272
Quarry Waste, Lime Production and ... 24
Quarry Work, Tunneling in ... 80

Raking Moulding on External Angle, Illustrated ... 185
Raking Mouldings on Internal Angles, Illustrated ... 136
Road Building in the Rockies ... 32
Road Building, Strange Material for ... 122
Rock Imperfections, Waste from ... 125
Rodin, the Sculptor ... 20
Rottenstone, Tripoli and ... 512
Russia, Abestos Industry of ... 76

St. Paul's Cathedral, Repairing ... 226
Saint Sofia, Marble Work in ... 172
Sand and Sandstones, Illustrated ... 464
Sand for Building Purposes ... 319
Sandstones, Sand and ... 464
Santander, Marble of ... 559
Sandstone, Sawing and Working ... 324
Sawing and Working Sandstone ... 324
Scotch Masons, Wages for ... 220
Sculptor, Rodin the ... 20
Serpentine in Chester, May Quarry ... 35
Silica, The Uses of ... 462
Slate Flashings for Roofs ... 511
Slate in Canada, Stone and ... 74
Slate Industry at Granville, The ... 27
Slate Men Do Not Push Their Product ... 373
Slate Men Learn the Lesson, Will ... 37
Slate Prices, Advance in ... 85
Slate Producers in Pennsylvania ... 38
Slate Production, America's ... 372
Slate Roofs, Patriotism and ... 323
Slate, The Users of ... 412
Slates, Close-Mitering, Illustrated ... 521
Slating a Conical Tower, Illustrated ... 233
Soapstone Output, Talc and ... 316
Soapstone, Talc and ... 173
State Assistance for Housing ... 274
State Office Building at Albany, A ... 26
Statuary, Camouflage for ... 555
Statuary for Washington Arch, Illustrated ... 127
Stone and Coal ... 422
Stone and Slate in Canada ... 74
Stone Barns of England ... 271
Stone Church in Cincinnati, A New ... 23
Stone Cofings, Fixing Iron Railings in ... 566
Stone Construction, Good Work for ... 75
Stone Crushers for New Zealand ... 133
Stone Cutters in Convention ... 93
Stone Facings for Ancient Walls ... 31
Stone for Five Residences ... 277
Stone Fountains in America, Illustrated ... 29
Stone Garden Seat, A, Illustrated ... 282
Stone Houses in Italy ... 232
Stone Houses of Pennsylvania ... 273
Stone Industry, A New ... 369
Stone, Monumental Art in, Illustrated ... 276

Digitized by Google

PAGE

Stone, Romance of..... 268
Stone the Noblest of Building Materials..... 78
Stone the Standard Material..... 85
Stone Trade and Building in England..... 559
Stone, What Missouri Offers in..... 415
Stonework for the Philadelphia Library..... 506
Stonework in Argentina, Ancient..... 370
Stonework in the French Cathedrals..... 466
Stones, American Use of Big, Illustrated..... 463
Stones Suitable for Crushing..... 174
Stones, Unhewn, Japanese Lovers of..... 79

Talc and Soapstone..... 173
Talc and Soapstone Output..... 316
Talc in the Transvaal..... 28
Talc in South Africa..... 556
Terra Cotta, Cut Stone Cheaper Than..... 423
Terra Cotta, Defects of, Illustrated..... 180
Texas, Granites of, Illustrated..... 129
Tile Men Held for Federal Court..... 40
Toronto's New Terminal Station, Illustrated..... 511
Toronto Station Completed, Exterior of..... 326
Transporting a Big Block of Stone..... 281
Tripoli and Rottenstone..... 512
Tufa as a Building Stone..... 410
Tunneling in Quarry Work..... 80

War and the Building Stone Industry..... 411
War, Building During the..... 519
War, Building Trades and the..... 280
War, Lessons of the..... 469
War Memorial Cloister, A..... 417
War Service Committee on Building Stone..... 362
Washington Arch, Statuary for, Illustrated..... 127
Washington's Capitol and Native Stone..... 19
Waste from Rock Imperfections..... 125
Whetstones, Oilstones and..... 509
Win the War First..... 375
Wire Rope, Licenses for Shipment of..... 90
Wisconsin as a Granite State..... 34

Illustrations Without Text

Albany, N. Y.: James H. Manning Mausoleum..... 131
A North Carolina Granite Quarry..... 325

Belgium: The Belfry at Bruges..... 138
Boston: Interior of Art Museum..... 365

Carved Mantel in Buff Indiana Limestone..... 221
Chicago: The Louis Geyler Company Building..... 269
Cleveland, Ohio: John Hay Monument..... 31

Design for a Limestone Residence..... 415
Destruction of Concrete by Sea Water..... 83
Detroit: Corridor in Michigan State Telephone Building. 461

PAGE

Effect of Alkali Soil on Concrete..... 85
England: Abbots Bridge, Waltham Abbey..... 427
England: Canterbury Towers from the West..... 43
England: Chapter House at York..... 139
England: Courtyard at Westminster..... 425
England: Gateway of Ely College, Cambridge..... 283
England: Gazebo at Ashby-de-la-Zouch 473
England: Leigh Church, near Southend..... 42
England: Rockford Church Tower, Essex..... 92
England: South Porch of St. Mary's Church, Oxford... 235

France: Bay Window at Montpelier..... 41
France: Entrance, Church of St. Gertrude, Caudebec.... 331
France: Entrance of the Chateau d'Amboise..... 91
France: Notre Dame la Grand, Poitiers..... 333
France: Tower at Nevers..... 472
France: Tower at Orleans 567

Germany: Corbel of Nurnberg Castle..... 35
Germany: Stargard Gate, New Brandenburg..... 330
Getting Out Big Blocks of Marble..... 413

Italy: Capital of St. Marks, Venice..... 285
Italy: Hauling a Huge Block of Carrara Marble..... 75
Italy: Marble Screen Panels, Ancona..... 379
Italy: Marble Screen Panels, Bitonto..... 378
Italy: Marble Work at San Michele, Lucca..... 332
Italy: Tower of St. Maria de Gradillo, Ravello..... 380

Kansas City, Mo.: Residence of Walter S. Dickey..... 419
Kansas City, Mo.: Residence of C. R. Hurst..... 277

Locust Valley, N. Y., Entrance to Aldred House..... 559
Locust Valley, N. Y., Marble Fountain in Aldred Home.. 557

Modern Marble Quarry and Equipment..... 411

New Jersey: Exterior of Cloisters, Princeton University 363
New York: Apartment House at No. 270 Park Avenue. 507
New York: Apartment House Entrance in Limestone... 317
New York: Fahnestock Residence 367
New York: Furness, Withy & Co. Building..... 321
New York: Guaranty Trust Company Building..... 77
New York: Interior of St. Thomas' Church..... 123
New York: Jewish Social Center, West Eighty-sixth St. 319
New York: Museum of the American Indian..... 175
New York: Racquet and Tennis Club..... 219

Oberlin, Ohio: Entrance of Art Museum..... 25
Oberlin, Ohio: Front and Side Elevation of Art Museum 27
Ohio: Preble County Courthouse, Eaton..... 555

Pennsylvania: First Presbyterian Church at Greensburg 417

Quarrying a Big Block of Marble..... 177

Simple but Dignified Indiana Limestone Mantel..... 225
Spain: Gateway of the Sun, Toledo..... 426

Train Load of Tennessee Marble..... 81

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FRANK W. HOYT, Editor

VOLUME XXXIX | JANUARY, 1918 | NUMBER 1

CONTENTS

	PAGE
WASHINGTON CAPITOL AND NATIVE STONE	19
RODIN THE SCULPTOR	20
PULVERIZED LIMESTONE FOR AGRICULTURAL USE	20
THE DANBY CLIFF-WORKERS, *illustrated*	21
A NEW STONE CHURCH IN CINCINNATI	23
LIME PRODUCTION AND QUARRY WASTE	24
PRODUCTION OF GANISTER IN THE UNITED STATES	25
A STATE OFFICE BUILDING AT ALBANY	26
THE SLATE INDUSTRY AT GRANVILLE	27
PRODUCTION OF GRANITE IN MAINE	28
HISTORIC CORNERSTONE LOST	28
FOUNTAINS IN AMERICA	29
BUILDING MATERIAL FOR HALIFAX	30
STONE FACINGS FOR ANCIENT WALLS	31
ROAD-BUILDING IN THE ROCKIES	32
ARTISTIC CHURCH STONE WORK, *illustrated*	33
NATURAL STONE WINS OUT AT DUBLIN	34

	PAGE
EDITORIALS:	
Will the Slate Men Learn the Lesson	37
Our Great Mineral Wealth	37
PRODUCTION OF MARBLE IN THE UNITED STATES	38
SLATE PRODUCERS IN PENNSYLVANIA	38
NOTES FROM THE STONE FIELD	39
TILE MEN HELD FOR THE FEDERAL COURT	40
CONSTRUCTION NOTES	41
ILLUSTRATIONS:	
Entrance Oberlin College Art Museum.	
Front and Side Elevation Oberlin Art Museum.	
Depew Fountain at Indianapolis.	
Memorial to John Hay in Cleveland.	
Corbel, Nürnberg Castle, Germany.	
Bay Window at Montpelier, France.	
Leigh Church, England.	
Canterbury Towers, from the West.	

ALPHABETICAL LIST OF ADVERTISERS

Appalachian Marble Co 2
Ardolino Brothers 46

Bacon, Earl C. 52
Barnum, George 50
Barr, Thaw & Fraser Co. 46
Bedford Steam Stone Works 46
Bethel White Granite 11
Blum & Delbridge 46
Books for the Trade 50
Bowman & King Stone Co 46
Bowling Green White Stone Co. 10
Brainerd, Shaler & Hall Quarry Co. 4
Brodix & Malone 12
Brown, George & Co. 6
Buckeye Gray Sandstone 18
Building Stone and Clay Record 50

Cameron, A. S., Steam Pump Wks. 51
Carr & Ball 46
Carthage Marble & White Lime Co. 46
Chicago & Bloomington Stone Co. 46
Clark-Conroy & Co. 46
Cleveland Stone Co. 17
Connecticut Brownstone 4
Consolidated Stone Co. 15
Craig Co., John J. 2

Dallet Co., Thos. H. 51
Dark Hollow Gray Limestone 15
Dupont Powder Co. 49

Empire Engineering Co., Inc. 56
Empire Stone Co. 46

Farrell Foundry & Machine Co. 52
Falt & Co., J. P. 12
Flory Mfg. Co., S. 52
Frenier & Son 52
Furst-Kerber Cut Stone Co. 14

Georgia Marble Co. 5
Gray "Canyon" Sandstone 4
Gray Eagle Marble Co. 2
Gillies & Sons, James 46

Hanlein & Son, Henry 12
Harrison Supply Co. 49
Heinlein Cut Stone Co., John 46
Hendricks Commercial Register 51
Hind, Edward W. 6
Hoosier Cut Stone Co. 4

Indiana Limestone Quarrymen's Ass'n 13
Indiana Quarries Co., Inside back cover
Ingersoll-Rand Co. 51

Laidlaw Dunn Gordon Plant 45
Lidgerwood Manufacturing Co. 44
Lincoln Iron Works 48

Manning, Maxwell & Moore, Inc. 52
Marble & Marble Workers 2
Marine, Arlando 46
McDermott Stone Co. 10
McLaren & Sons, James 12
McMillan & Son, W. 16
Mt. Nebo Marble Co. 4
Meyers Machine Co., Inc., Willard F 53
Middlebury Marble Co. 9
Miller Co., David 46
Monahan Stone Company 46
Morrison, D. G. 46

Napoleon Gray Marble Co. 7
Nash's Expeditious Measure 52
New Albany Machine Mfg. Co. 56
Northern Engineering Works 52

Ohio Quarries Co. 18
Oldham, George & Sons 49

Patch, F. R. Mfg. Co., Inside back cover
Phenix Marble Co. 7
Pollard Mfg. Co., Ltd. 47

Quincy Column Turning Co. 10

Rockport Granite Co. 10
Roebling's Sons, John A. 45
Ross & Republic Marble Co. 2
Royal Marble Co. 2

Shaw Electric Crane Co. 52
Shea & Donnelly Company 14
Slate Industry of the World 4
South Dover Marble Co. ..... Back cover
Spurr & Son, J. J. 16
Star Stone Co. 12
Steam Stone Cutter Co. 48
Struble Cut Stone Co., Henry 46
Sullivan Machinery Co. 45
Sutermeister Stone Co., A. 46
Sylvan Green Marble Co. 4

Tompkins-Kiel Marble Co. 8
Trow & Holden 44

Vermont Marble Co. 3
Victoria Marble Co. 2

Woodbury Granite Co. 11
Worthington Pump & Mach'y Co. 45

BUYERS' DIRECTORY OF THE STONE TRADES, PAGE 54

CLASSIFIED ADVERTISEMENTS, PAGE 56

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STONE

VOLUME XXXIX MARCH, 1918 NUMBER 3

Building By Time Table

ALTHOUGH the sight of a skyscraper rising rapidly and noisily in a city street is familiar, few persons appreciate the system which makes possible this mushroomlike growth of steel and masonry. Were the materials employed placed about the site convenient to the builder's hand they would cover several acres, says a writer in the *Sun*. The machinery used in making excavations and handling great masses of steel and stone is again very bulky and difficult to handle. The modern skyscraper nevertheless must rise besides a busy thoroughfare, perhaps be surrounded by crowded streets, without interfering with traffic for a single hour.

Every detail of the complicated structure must be prepared, often at a great distance, and all must be assembled with rapidity. To accomplish this the entire operation of preparation and building is carried out according to a fixed time table, which must be followed as rigidly as that of a railroad. The new Equitable Building, which will be the largest mercantile structure in the world, surrounded as it is by four very busy streets, affords a striking example of this system.

Time is so valuable in such work that the time tables must be worked out to the minute in advance. The moment the contracts have been signed for the building of a skyscraper the wrecking firms who tear down the original structure are notified and the time table is quickly put into operation. The wagons which carry away the debris first of all must arrive on time to the minute, load and disappear to make room for other groups. There is no room in the busy streets for them to stand and wait their turn, so this part of the time table must be arranged to correspond with the schedule of the workmen. There is no room, as a rule, to pile up the material and if the wagons do not arrive exactly on schedule the workmen may be forced to stand idle and the time table be seriously disorganized.

Once the ground is cleared there is the same anxious economy of time in assembling the machinery for excavation. The exact hour at which one set of workmen will finish their work is calculated, and the new workers with their complicated machinery arrive at a fixed hour. As a rule there is no room for more than one group of workmen at a time, and a delay of a few hours in finishing a detail of the work will mean a serious loss of time and money. The work of digging the foundations, for instance, and the use of the great caissons which must be employed are laid out with the same accuracy. Drillings are made of the earth or rock to be cut away and the time required for the work is calculated to the hour.

The most serious problem is encountered, of course when the actual work of construction begins. In arranging the time table from now on it is necessary to calculate how long every detail of the construction will take. There is no room for storing the steel girders and other material used in construction. It must arrive just at the hour the workmen will be ready to receive it. Much of the material must be brought from great distances. When hundreds of skilled workers are employed a delay of even a few hours counts up very fast. And it is almost as serious to have the materials arrive ahead of schedule as behind time. There is no room to pile up the bulky girders or the tons of stone or brick or woodwork, and if the trucks and wagons are ahead of time they must stand for hours waiting their turn.

With everything working smoothly these complicated structures rise with the rapidity of Aladdin's palace. Despite the handicap of space the steel framework will often go up at the rate of two or three stories a day. And no opportunity is overlooked to crowd as many different groups of workmen on the building as possible. As quickly as the steel framework has risen above the ground the masons report on still another time table to begin the doorways and other details of the base. The complicated plants of boilers and engines meanwhile must be placed in position and all this must be nicely arranged after the time the foundations are ready to receive them and before the rapidly rising steel construction shuts off the entrance without delaying the general progress. The walls of these towering structures again must be hung upon the interior skeleton at the earliest possible moment. The bricklayers or masons work upon long platforms suspended from the steel structure as soon as the frame will bear them,

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and a special time table must be arranged for their work.

Each load, brick or stone or wood, must arrive just in the nick of time. The length of time required by each group of workmen is so carefully calculated that the builders can tell the day and hour when other workmen may be engaged to report to take their places. The same system applies to the finishing and decorating of the great structure. So accurate is this time table that even before the first blow is struck definite agreements may be made with tenants stating the day and hour when they may take possession. The building of a modern skyscraper is one of the most remarkable examples of modern efficiency methods.

Building Material in French Morocco

Building material is a branch of business in Morocco (French Zone), in which there are great possibilities, as, apart from a few of the coast ports at which building was being carried on very extensively at the commencement of the war, Morocco is in an undeveloped state, says a British commercial journal. With the advent of railways and motor transport, it is highly probable that the larger towns, such as Fez, Marrakesh (Morocco City) and Mequinez in the interior, will be developed to the same extent, comparatively speaking, as Casablanca and Tangier.

The greater part of public and private construction work entailing a demand for contractors' supplies will undoubtedly be executed by French contractors, who are favored through having their own sources of supply. Consequently, no great opening can be anticipated in this direction for firms of other nationality. On the other hand, such items of contractors' equipment as spades, shovels, pickaxes, pumps and winches already have a market with the natives.

It is possible that no paving material will be imported into Morocco for some time to come, if ever, since the natural resources of the country may prove sufficient. But it may be pointed out in this connection that the material available is very inferior, in proof of which the bad state of the roads a few months after their completion or repair is instanced. The stone as yet available is, in fact, too soft to be suitable for road-making. Tar macadam has not yet been introduced in any of the Moroccan municipal paving schemes, but, should the authorities eventually decide to adopt it, there would be a good opening for road tar, both artificial and natural.

Strange Material for Road-Building

Roads can be made from the enormous quantity of wornout boots condemned by the British army, according to an article in "Nature." "The Scientific American," commenting upon this, says: "While there are more profitable uses for uppers, the scrap leather of soles is mixed in the proportion of from 5 to 10 per cent with slag, granite or limestone, in conjunction with asphalt and bitumen. The mixture is known as 'Broughite,' and is said to possess the hardness and rigidity of the ordinary tar macadam road, with greater resilience and less dust. The British Roads Board is now experimenting with it. Waste leather is also used for making animal charcoal, and a by-product of this process is ammonium sulphate, suitable for use as a fertilizer. Uppers yield a considerable quantity of grease, available for use in currying leather and for other purposes. Several minor uses of old boots are mentioned, including the manufacture of leather board, leather pulp washers, mats, cyanides, prussiates, glue and size."

The Oklahoma State Capitol

One of the most important of recent stone jobs in the Southwest is the Oklahoma State Capitol at Oklahoma City, an illustration of the exterior of which we are presenting herewith. In slightly less than two and a half years after the building was started, it was first occupied by the legislature. The Capitol is by far the largest building in Oklahoma, containing more cubic feet of space inside the walls and covering more ground than perhaps any three other buildings in the State. The structure has a total frontage of 424 feet, and a depth of 302 feet, and there are 282 rooms. The architects were Layton & Smith, of Oklahoma City.

The exterior finish of the building is in Oklahoma granite and Indiana limestone. The native stone is known as Tishomingo granite and came from quarries at Troy, in Johnston county, the Capitol being the fourth public building in the State in which this stone has been used, the other three being the Oklahoma City and Guthrie federal buildings and the Johnston county court house at Tishomingo. This was employed from the foundation up to and including the ground floor, 34,000 cubic feet of the stone being required. The granite was shipped to the Capitol in its rough state, and was cut and finished at the site. A large cutting plant was erected and equipped, and fully 100 men were engaged in the work.

All above the ground floor is of Hoosier Silver Gray Indiana limestone, from the quarries of the Indiana Quarries Company, Bedford, Ind. The stone was finished at Bedford by the Shea, Donnelly & Giberson Company. There were about 161,000 cubic feet of the Indiana limestone called for. It was necessary to quarry a number of extra large pieces for this building, particularly the two kneelers on each gable (eight in all). These pieces contained about 400 cubic feet each. The Corinthian capitals required blocks of extraordinary size, about 250 cubic feet each.

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American Operation of French Quarries

ALMOST without exception the European quarries are poorly equipped and are operated according to antequated methods. We have called attention to these facts many times. Modern quarrying and stone-working machinery is almost entirely of American design and manufacture, and has found only limited adoption abroad. The great Scandinavian granite quarries, which have an enormous output and a wide market, depend very largely upon hand drills and hand or horse-power hoists. The channelling machine, which we use wherever possible for the quarrying of dimension blocks, is almost unknown abroad. Even in the English quarries which produce the magnesian limestone so largely used in building operations, it is still customary to use hand picks for cutting a trench around a stone, and then break it loose with wedges. York stone, which has to be mined because of the overburden, is sawed out by hand, a slow and wasteful process. Before the war the Belgian quarries were fairly progressive, and were the best equipped in all Europe. Electric power was utilized, and the vast quarries at Quenast would bear comparison with any, both as to organization and operation. The French slate quarries at Angers were also under progressive management, and could give a needed lesson to our own slate operators. Still, these were exceptions and did not indicate the usual quarrying practice.

It is needless to say that quarry operations in the countries engaged in war have been almost entirely suspended, save where the product is needed for war purposes. There is little or no building activity, but there has grown up an enormous demand for crushed stone for highway and concrete work. It will be remembered that the United States has recruited a Quarry Regiment whose services are being utilized in France to speed up production. There is no doubt that their efforts will have a wide effect after the war is ended in leading to a more general adoption of improved methods and equipment.

Robert K. Tomlin, Jr., the war correspondent in France of the *Engineering News-Record,* has contributed to that journal an interesting account of a recent inspection of the French quarries by two United States engineers, who made a 900-mile automobile trip for the purpose. These engineers were of the road department of our army, and they were seeking to increase the output per man per day of the quarries that are to be worked by the Ameican forces to supply crushed rock for military and building and track ballast. Mr. Tomlin says that the labor used was to a large extent African, although there were some French workers. Sometimes an Ingersoll-Rand compressor and jackhamer drills were in evidence, but for the most part the drilling is done by hand. The rock is a soft limestone, with layers of clay intervening. The quarries as a rule are worked in low faces, and drill holes are commonly about 8 feet deep. After being broken out by explosives the rock is fed into small jaw crushers, or else reduced in size by hand tools. The rock is screened in inclined grizzlies with ½-inch spacing, and for breaking the large chunks one of the prevailing implements is a small hammer on the end of what is described as a "bamboo cane." Such mechanical crushers as were observed were run with any kind of power available—sometimes steam, sometimes gasoline, sometimes electricity.

Most of the loading into cars is hand work, and a

THE OKLAHOMA STATE CAPITOL AT OKLAHOMA CITY

The walls of the building above the first floor are of Hoosier silver-gray limestone from the quarries of the Indiana Quarries Company, The stone was cut by the Shea, Donnelly & Giberson Company, Bedford, Ind.

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radical difference between these wartime quarries and the kind an American engineer is accustomed to is the absence of storage bins. This lack of bins was noted throughout their trip by the two American engineer officers. All rock storage of the smaller quarries is either in stockpiles on the ground or in the cars themselves. Two reasons are advanced for this practice. In the first place, lumber in France is pretty much of a luxury these days, and in the second, a group of storage bins might tempt an enemy airman to a test of his marksmanship with high-explosive bombs. As a means of increasing output in any quarries which American forces may operate, it is the intention to dispense with hand loading of cars to as great an extent as possible. Much of the crushed rock is transported by means of the French system of canals in boatloads of 250 metric tons each.

There is one French quarry of large size where trap-rock is procured and where crushes and mechanical devices of various kinds are more in evidence than at the smaller limestone quarries. This big quarry is in the form of a large "glory hole" which is worked in six benches each 25 feet high. The stone, however, is lowered in cars on gravity planes to the tunnel level instead of being drawn through chutes. The output of this quarry is 600 tons a day with a force of about 400 men. Steam-driven air compressors, tripod drills, jackhamers and mechanical chain haulage through a long tunnel are features of these works. The storage, however, is principally on the ground or in the small wooden quarry cars, of which there are about 1,500. This is the biggest of the French quarries, and trap rock is shipped from it by rail to points as far distant as 150 miles.

Use of Ledge-Stone in Building

"Local color is everywhere one of the most delightful characteristics of good building, a distinguishing trait without which American architecture would lack interest and variety," says Phil M. Riley in Hoggson's Magazine. "Sometimes local color manifests itself in style or design, sometimes in the constructive materials, and again in a combination of the two.

"Ledge-stone construction brings to mind recollections of early Pennsylvania homesteads, just as certainly as the dominant horizontals of the so-called 'Prairie' school of architecture suggest the great flat expanses of the Middle West. Invariably associated with California, the Mission style has also distinguishing traits, to be sure, yet the local color of a Mission house depends as much upon the red tile of its low-pitched, overhanging roof and its plain cement walls, reminiscent of the primitive stucco-coated adobe, as upon its arcaded patios and elaborate gables.

"Even our national heritage in architecture, the so-called Colonial style, is rich in the number and variety of its prototypes, every one of which possesses local color to an eminent degree.

"In these early-settled sections of America the prospective home-builder of taste and refinement, who would have his new home in happy accord with its older fellows, cannot do better than to adapt a local type to the embodiment of his desires, even as in eastern Pennsylvania, where stone is the locally available building material, often obtainable in sufficient quantity on the site.

"Stone is generally conceded to be a less responsive medium of architectural expression than wood, although superior in cost and value, insuring a permanent building of substantial, comfortable appearance. Ledge-stone, therefore, in localities where it occurs, makes particular appeal to refined, conservative taste because of its restful horizontals and broad wall texture, in which latter quality the rough rock surface, the color of the mortar pointing and the light and shadow effect all play a part.

"As contrasted with the pernicious round-stone fad, the integrity of a sturdy ledge-stone wall that would stand quite as securely without the aid of bonding mortar sounds a welcome note of sincerity, that cardinal excellence of good architecture. Despite the plain, compact mass, symmetrical arrangement, ranging windows and generally formal aspect of the early homes of this type, these houses indicate that in competent and resourceful hands ledge-stone construction is sufficiently flexible to meet the many complex domestic requirements, even to the extent of providing such refinements as the sleeping porch and pergola-type of veranda.

The Governments Need for Crushed Stone

On a complaint of a large company that the market for gravel and crushed stone that was held so high that it was impossible to avoid delays in important construction work for the Navy. Rear Admiral Haliday recently came to New York from Washington and conducted an investigation. A conference of crushed stone and gravel men was called and the proposition was made for gravel to be mixed and shipped at a certain upset price, below the current wholesale list. The gravel men protested that such a proceeding would be confiscatory.

At the same conference the Navy officials questioned the crushed stone interests and stated that 1,000,000 yards of crushed stone would be required. That would leave a like amount available for private needs, because the quarries in this vicinity can turn out about 2,500,000 yards a season. Current quotations now rule for three-quarter-inch gravel at from $1.80 to $1.90 a yard wholesale, New York, to private operations, and on crushed trap rock and bluestone about the same levels prevail. One year ago at this time the price for gravel was $1 a yard and bluestone $1.10. Trap rock was at that time $1.15.

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Waste from Rock Imperfections

THE term "waste" is subject to varied definitions. Some quarrymen define it as that part of the quarried rock which can not be utilized for any purpose whatever. Others include with waste those by-products which may be disposed of at a price which will not compensate for the cost of production. It is evident that no quarryman will, if he can avoid it, quarry stone from which he can not realize a sum sufficient to pay the cost of operation, and the production of such rock is occasioned only by the necessity for its removal in order that stone of better quality may be available. Such inferior material may properly be classified as waste, and the term "waste," as used in the bulletin by Oliver Bowles, "Sandstone Quarrying," issued by the Bureau of Mines, includes, therefore, those portions of the quarried rock which are lost in manufacture, thrown away, or utilized as by-products which, on the average, bring returns smaller than the cost of production.

Waste in sandstone quarrying may be attributed to a variety of causes, many of which are due to natural imperfections in the rock. Waste is also caused by improper methods of separating the rock masses from the quarry ledge. In many quarries joints are straight and regular and occur in a parallel system or in two systems at approximately right angles, conditions that favor economical quarrying if the joints are spaced at convenient distances to permit the production of blocks of reasonable size. If the joints are too closely spaced, the blocks available will be too small to command the best price on the market. The most economical spacing depends on the use for which the stone is best adapted, and conditions of spacing that might be quite suitable in one quarry would be unsuitable in another.

In other quarries joints may be curved and uneven and intersect at oblique angles. When this is the case angular and uneven blocks are quarried, and much rock is lost in reducing them to suitable shape. Joints may occur in closely spaced groups, all the rock within the boundaries of such groups splitting out in thin slabs which are usually curved, fractured and of little or no economic value. "Casing" is a local term applied to thin slabs that split out between closely spaced joints.

Blind seams or dry seams appear as fine lines on the rock surface. In some sandstones circulating water containing silica in solution deposits silica in the seams, and thereby cements the rock until it is practically as strong as though no seam ever existed. Usually, however, the rock parts easily along such planes. Commonly they are sufficiently open to permit oxidation of the rock adjacent to their walls, making them appear as stained lines across the rock surface. They are prolific sources of waste in sandstone quarries.

Open bedding planes at moderate intervals greatly facilitate quarrying. If, however, bedding planes are less than 5 or 6 inches apart, the rock will probably be useless, although, if true and even planes occur, good slabs may be obtained where open beds are only an inch or two apart. When such planes are ill defined, are a fraction of an inch to one or two inches apart and irregular, the rock must be classed as waste material. Thin bedding may be due to processes of deposition such as sudden and frequent changes in the nature of the material deposited; or it may be due to processes of surface weathering which tend to open up the bedding planes. The upper part of most of the Ohio deposits is thin-bedded to various depths, attaining a maximum of about 35 feet. This thin bedding is thought to be due to conditions of deposition, although surface weathering has undoubtedly emphasized it. Thin-bedded deposits are not always the upper beds of sandstone ledges; they may be interbedded with heavy and sound beds. Conditions of deposition ob-

INTERIOR OF ST. THOMAS' CHURCH, NEW YORK
The walls and floors are finished in variegated buff sandstone from the quarries of the McDermott Stone Co. at McDermott, Ohio. The building is one of the largest and most important parish churches in America

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viously account for this state. Thin bedding accounts for a considerable part of the waste in some localities.

Where the surfaces of open beds are in straight, uniform, smooth planes, as in some quarries near Berea, Ohio, the upper and the lower surfaces of the blocks obtained require no scabbling, and therefore no material is lost in this process. Bownocker gives a remarkable example of uniform bedding planes in southern Ohio sandstone. In other localities, as, for example, in certain beds of the Kettle River sandstone of Minnesota, the bedding is wavy and uneven, and the irregularities on the blocks of stone obtained from such beds must be scabbled or sawed off, with consequent waste of stone.

In certain deposits bedding planes are not all parallel. The thickness of a bed lying between two converging planes varies from point to point, and blocks obtained from such a bed lack paralellism between their upper and lower faces. The forms into which sandstone blocks are shaped are with few exceptions parallel faced, and it is therefore obvious that a certain amount of waste must result in cutting non-parallel-faced blocks into parallel-faced forms. Cross bedding in sandstone may result in uneven or inclined bed splitting, and non-uniform blocks will result. The removal of irregularities will, as in the instances recorded above, involve waste of stone.

Most fine-grained sandstones are more desirable than those of coarser grain, as they are better adapted for cutting and carving and are usually of low porosity and of attractive appearance. Coarse-grained sandstone may, therefore, be of low grade, and may even be classed as waste. For most purposes for which sandstone is used it is desirable that the grain size be uniform. The stone may be so pebbly that it may be classed as conglomerate, and most conglomerates can be utilized only as crushed stone for riprap or the roughest of building purposes. Pebbles in sandstone may break out, leaving a pitted surface, or the surrounding material may fall away first, leaving the pebbles as protuberances on the surface. The appearance of a rock surface which shows marked variation in size of grain is usually unattractive. Non-uniformity of grain size may therefore result in many blocks being thrown on the waste heap.

The individual grains of a sandstone may be cemented together insecurely, and the rock may be so friable or easily crumbled as to be useless for structural purposes or for making abrasives, such as grindstones or whetstones. It may be noted, however, that some rather friable stones harden greatly upon exposure to the atmosphere. Friable beds may occur in ledges that have well-cemented beds above and below them and may cause a high percentage of waste. Usually, however, a condition of extreme friability is confined to surface beds where the cement has been lost by weathering or is characteristic of entire ledges where geologic conditions have not favored the process of cementation. Rocks in the latter condition can scarcely be classed as quarry waste, inasmuch as they are all waste as regards uses requiring reasonable hardness, and therefore quarrying of them should never be attempted.

On the other hand, the grains may be cemented together so firmly that the rock is extremely hard and has the appearance of massive quartz. Although such rocks, termed "quartzites," are probably the most durable of any now in use, the cost of production may be prohibitive on account of the difficulty in quarrying. Excessively hard beds may therefore be classed as waste. Such indurated beds do not, however, occur commonly in quarries in which the principal rock mass is of moderate hardness. Conditions of cementation have usually been constant over considerable areas and for long periods of time, and as a consequence the state of aggregation of sandstone tends to be fairly constant throughout an entire ledge of rock of the same geologic age. Just as in the case of the extremely friable rock, the quartzites commonly constitute entire ledges. If their condition is such that they can not be worked profitably, they are to be classed as unavailable material rather than as waste.

In the preceding discussion conditions of cementation have been considered in their relation to entire beds or to entire deposits. A condition that involves more serious consequences in many deposits is non-uniform cementation in different parts of the same bed. Occasionally small masses are found in which the grains are poorly cemented. They are, therefore, more friable than the surrounding material and may crumble away, leaving hollows or depressions in the surface. Their presence also reduces the crushing strength of the rock. Again, certain masses may be cemented more firmly than the surrounding blocks. They constitute the so-called "hardheads" or "niggerheads" that quarrymen deplore. It is probable that some of them are in the nature of concretions. They not only result in waste of material, but they reduce the rate of channeling, and may cause the channel steel to take a crooked course.

The ideal state of aggregation for building stone is a condition of uniform cementation throughout the rock mass, the degree of cementation attaining a proper balance between workability, which controls in part the cost of production, and induration, which is the chief factor of durability. For other purposes to which sandstone may be applied, as, for example, the making of pulp stones or grindstones, a certain definite state of cementation is demanded, and little latitude may be allowed in seeking rock of more easy workability.

Porosity bears a more or less intimate relationship to state of aggregation. Friable sandstones usually are lacking in cementing material, intergranular spaces are incompletely filled, and therefore the rock is porous. Indurated stones are, on the other hand, usually of low porosity on account of the pores being filled with ce-

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menting material. Most sandstones are somewhat porous. Absorbed water in the pores may by freezing destroy the rock. A high percentage of porosity is not in itself, however, an indication that the rock will disintegrate readily by freezing. As pointed out by Buckley, the size of the pores has an important bearing on the rate of disintegration. Large pores give up their contained water readily, and hence rapid or serious injury by frost action may not result. Small capillary pores will, however, give up the water contained in them less readily, consequently the effects of frost will be more disastrous. In judging the probable effect of porosity, therefore, one should observe the size of pores as well as the percentage of porosity. Not only are porous stones liable to disintegration by frost action, but they collect dust and dirt, and therefore darken rapidly.

Concrete Construction and Fire Loss

One of the great claims put forth by the advocates of concrete construction is its fire-resisting qualities. The effort is made to give the impression that structures of this kind are absolutely fire-proof, although the record of fire losses tells an entirely different story. One of the trade papers that is most enthusiastic in its praise of this material of construction gives an account of the repairs to a concrete warehouse in the Metropolitan District, damaged by fire, that tells a far different story. The writer says:

The damage to the structure consisted in many localized cracks in the walls and roof parapet, in the complete collapse of three panels of the fourth floor, in the shearing off of a column below the wrecked area in third story, and its partial failure or cracking all the way up to the roof, due to the settlement on the third floor, the similar failure, but not so pronounced in the corresponding column at the other end of building, and the extensive spalling of the fireproofing of a number of the beams throughout the building.

The repairs made consisted of the pointing up of all exterior cracks, replacing the collapsed portion and floor finish where necessary, providing steel hanger supports for ends of some beams detached by cracks from their former position, and the plastering up and strengthening of spalled beams. Where beams were not badly spalled they were simply plastered with concrete after cleaning off the spalled material, and brought up to their original section. Girders badly spalled were gone over and all loose concrete removed.

Statuary for the Washington Arch

As a fitting celebration of the birthday of the first President of the United States, the second and final group of statuary has just been placed on the pedestal at the north side of the Washington Arch, in Washington Square, New York. This represents Washington as President, and is by A. Stirling Calder, No. 51 West Tenth Street. The architects were McKim, Mead & White, and the group was carved by Piccirilli Bros., East One Hundred and Forty-second Street. The statuary is wrought from a single block of white marble from the quarries of the South Dover Marble Company, at Wingdale, N. Y. The block was twelve feet in height and weighed sixteen tons.

Washington Arch was built in 1894, after designs by the late Stanford White. Each of the two groups of statuary which now complete the structure cost about $15,000, with $2,000 additional cost for enlargement of the pedestal. Like the arch itself, the funds were raised by private subscription. The arch cost $130,000.

Mr. Calder, who was chief of sculpture of the Pan-

NEW STATUARY FOR WASHINGTON ARCH, NEW YORK
Panel by A. Sterling Calder, cut in a single block of white marble from quarries of the South Dover Marble Co.
Architects: McKim, Mead & White, New York

ama-Pacific Exposition, gives the following description of the group:

"The heroic marble group, twice life size, represents Washington as first President of the United States,

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supported by allegorical figures of Wisdom and Justice. Washington, occupying the center of the group, is carved in full relief, the supporting figures forming a compact background are in bas-relief; the two merged together by the accessories, fasces, drapery and lectern. Washington stands in Colonial civil costume as of some sixty years of age, firmly planted on his feet, head erect, regarding afar the vision of the future. The poise of the figure is magistral, stern yet easy, characterprising latent energy. The arms hang unaffectedly, evidencing his straightforword but reserved temperament. The left, with papers lightly held, rests on the shelf of a lectern, while the right arm extended at full length has completed a sweeping gesture. He has spoken, and is waiting with commanding patience. Behind Washington, modelled less realistically, as symbols of those ancient virtues of man's striving, stand Wisdom and Justice. Wisdom conceived as the modern Athena, helmeted, muses, with downward glance, her left hand resting on the shoulder of her mate, Justice. He, draped and crowned as defender of cities, bears the sword and scales, supporting behind the head of Washington, the book of record, with the motto, "Exitus acta probat."

Ask for Duty on Finished Marble Work

Mr. A. Kiel, president of the Tompkins-Kiel Company, has started a movement with the United States Tariff Commission looking toward the placing of a tariff on all finished marble work now brought into this country free of duty. The matter has been brought to the attention of the National Association of Marble Dealers, the Indiana limestone interests, the labor unions and quarry owners in general, and it is likely that concerted action will be taken to affoord a measure of protection for an important native industry.

In a letter dated February 8, F. W. Taussig, chairman of the United States Tariff Commission, says that the Commission is not making any inquiry regarding the free importation of statuary and the like. The subject, however, is one which must sooner or later engage our attention, for we are undertaking a survey of the entire tariff situation and will eventually have to include this item. We shall be glad to receive any information which you are able to give us and need hardly say that we shall give it careful consideration.

In reply to this, Mr. Kiel sent the following communication to Mr. Taussig: "For the past twenty-five years the marble and stone interests of this country have suffered greatly on account of the admission into this country, free of duty, all altars, fonts, pedestals, statuary, monuments, etc., and we hereby request that a thorough investigation be made to see whether it is not possible to place a duty of at least 100 per cent. on all this marble work so as to increase and promote our marble industry here, as well as encourage sculptors, marble manufacturers, stone cutters, plasterers, modellers, etc. We know of thousands of modellers and sculptors who have been unable to make a fair living for the past twenty-five years on account of this unfair competition from abroad.

"We beg to call your attention to the fact that there is a duty of 50 per cent. per cubic foot on the rough quarried marble if the work is done here, while the finished article is brought in free of duty. There is a market for many foreign marbles and these would still be used, so that the foreign countries would enjoy the same amount of business, because the marble would be brought in the rough, while at the same time our own workmen would derive the benefit of the work here. You must realize that they contribute largely to the support of the churches, and the more money they can make the more they will donate.

"For your information and guidance, we give you below figures taken from reports submitted by the Government at Washington showing the amount of materials imported free of duty for the year ending June 30, 1912, to 1916: 1912, $2,008,107; 1913, $1,873,914; 1914, $2,520,464; 1915, $796,593; 1916, $868,385.

"The above figures are the foreign values and do not include any carrying charges or duty on the rough stock, neither do they include the installation charges, so that if the work is contracted for here, they would be doubled or trebled in value and would be a credit to the trade in this country. The Government would also receive over two million dollars worth of revenue out of this business, to which it is certainly entitled."

This movement is one that should enlist the hearty support of every stone man in the country.

Building Industries Organize

About forty organizations representing the building and allied industries of the Metropolitan District have formed a coalition under the name of the Building Industries of New York for the purpose of aiding the departments at Washington in their shipbuilding and housing problems. Thirty-one associations in the Building Trades Employers' Association, in addition to the Real Estate Board, the Credit Association of the Building Trades of New York, the Chamber of Commerce of Queens, the Plate Glass Manufacturers of America, the National Lime Manufacturers' Association, the New York Chapter and the Brooklyn Chapter of the American Institute of Architects, the New York Architectural Society and the Building Material Exchange of New York comprise the organization while still retaininf their original identity in their respective trades. Others are yet to come in.

Hugh Getty, President of the Building Trades Employers' Association, was elected president; Ernest R. Ackerman, Laurence McGuire and F. T. Miller, vice-presidents; Allen E. Beals, secretary; G. Osgood Andrews, treasurer, and these directors: H. H. Murdock, chairman; C. J. Kelly, Ronald Taylor, Max Baumann, Elliott Smith, C. J. Curtin, Frank H. Quinby, C. Aubrey Jackson, Frederick C. Zobel and Edward A. MacDougall.

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Granites of Texas

IT has long been recognized that Texas has great wealth and diversity in stone resources. Almost all varieties of stone are found, both structural and decorative, and they are of good quality and desirable colors. Some deposits have been opened and developed, but none on a very large scale. The great trouble is the lack of adequate transportation facilities. If it were possible to get quarry products to the market cheaply and expeditiously, it is certain that various Texas stones would find wide use for building, decorative and monumental work. The University of Texas has just issued a bulletin on Texas Granite by J. P. Nash, testing engineer of the Bureau of Economic Geology and Technology. Mr. Nash says:

It has been said that the granite deposits in the central part of Texas contain more varied and serviceable granite than any equal area in the United States. While this is perhaps a debatable statement, it is certain that there is a wide range of colors and textures from which it is possible to obtain granite for almost any purpose for which that stone is now used. This material is found in the central part of the state, principally in Burnet, Llano and Gillespie counties. The development of the granite quarrying has been rather slow, due to the fact that, for the most part, the material is located at considerable distance from the railroad; and also because of the lack of capital. In the case of the gray granites, the most accessible quarry is 6 miles from the railroad, while others are as much as 12 miles distant. The coarse-grained red and pink granite deposits are somewhat more fortunately distributed, being within close proximity to a railroad, but these are perhaps the least desirable of all the granites for monumental and building stones.

The coarse-grained red granite is the most widely known, and to many this rock represents the typical Texas granite. It is true that more of this stone is produced in one year than of all other Texas granites to date. This is a coarse red and pink granite, hard, and with a high resistance to compression. While it has been used for building and monumental work, the chief use to which it is now put is for Government jetty work along the Gulf of Mexico. Thousands of tons have also been used in the construction of the Galveston sea wall. It is admirably suited for this purpose, being heavy and highly resistant to the corrosive action of sea water.

The gray granites are of varying shades and textures, but the only types now being worked are the rather fine-grained light and the dark gray stone. Their chief use at the present time is for monuments, for which purpose they are well suited. For polished surfaces for inscription, they are especially suited, as the lettering shows in remarkable contrast. These gray granites are comparatively easily worked; at least as easily as the average granite in the United States. The

ROLLING A 35-TON GRANITE BLOCK IN TEXAS

The big stone was transported eight miles in the same manner that was followed by the Egyptians thousands of years ago

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grain of the stone is finer than the average Barre stone, and somewhat coarser than the finer-grained granite from Quincy, Mass. The Texas gray granites are said to be equal, if not superior, to the eastern granites, but it is necessary that they be selected with some care. This is due to the fact that most of the stone already taken out has been from close to the surface, the deepest quarry being at the present time only 50 feet. If the stock is not carefully selected, the quarrymen are apt to ship stone that contains streaks, thus injuring the reputation of the material.

In Gillespie County is located a deposit of a rich red granite which is an excellent stone for polishing, as this brings out the color to good effect. This is a medium-grained stone, and is found in immense deposits in this county. Like the gray granites, it also has the disadvantage of being away from the railroad, the nearest workable stone being about 4 miles from Fredericksburg, the nearest shipping point.

In spite of the unfavorable locations of these Texas granites, there is produced yearly more than 200,000 cubic feet, the equipment necessary for this production representing an investment of approximately $300,000. The greater part of this output is of the red granite from Granite Mountain. The quarry at Granite Mountain up to date has produced more than 3,000,000 tons of stone. It is now operated by Darragh Brothers. It was opened in 1882 for the purpose of obtaining stone for the construction of the Texas State Capitol Building at Austin, which is the largest state capitol in the United States, and cost $3,000,000 in public lands. The stone has weathered well, and shows no signs of disintegration. For massive work of this kind, in the bright Texas sun, the stone seems well suited, as it reduces the glare. It has also been extensively used for the bases of buildings, and, when tool faced, develops a very pleasant delicate pink color. The base of the Austin post office is a good example. A large number of monuments and tombstones have been cut from this stone. For this latter purpose, however, it is questionable if some of the finer-grained granites would not have been better suited; but this is a matter of individual taste. By far the largest tonnage of this stone goes into the construction of jetties, breakwaters, and other wave-resistant structures.

The greater proportion of the gray granites of Llano County is used in monuments of various kinds. The fact that all the stone must be hauled in wagons to the railroad over dirt roads eliminates them from most of the building stone business. Besides this, the freight rate is rather high on such material. A large quantity of stone is quarried that is suitable building stone, but it is cast into a dump in order that the monumental stone may be extracted. This increases the cost of the stone, and, when combined with poor shipping facilities and unfavorable freight rates, the final cost is practically the same as, and, in places 300 miles away, more than that of the eastern stone. Many of the gray granites should make excellent stone blocks for heavy traffic pavements. For instance, a close-grained granite from Tom Norton's place had a compressive strength of more than 20,000 pounds per square inch, a hardness when tested in the Dorry hardness machine of 18.8, and a toughness of 15 in the Page impact toughness machine. Some granite paving blocks were laid in Houston about 9 years ago, and are said to be still giving satisfaction. As a building stone, the chief use of the granites has been for the lower courses of county court houses and post offices in the state.

The red granite of Gillespie County is used exclusively for monumental work, especially for polished work, as the polishing brings out the rich red color. For rough cut building stone, this stone is not so desirable, as the stone is rather dull for this use.

There are a number of other deposits of workable granite in the state, in Mason and San Saba counties. One quarry in Mason County is now operating to a limited extent, but the stone must be hauled 17 miles before it is loaded on the cars. These deposits are too far from the railroad to be a commercial success. In West Texas there are located several unworked granites, as at Iron Mountain and on Captain Jason James' ranch in Brewster County.

In this connection we reproduce a very interesting illustration from the bulletin. This shows the method that was adopted to transport a 35-ton block of granite eight miles from the quarries to Llano for shipment. It will be noted that the block has been made roughly into a huge cylinder by wrapping logs around it, bound with wire rope. It was then rolled along through the aid of a hoisting engine mounted on a truck. This ingenious method is much the same, except for the power, that was practiced by the ancient Egyptians. We have a very minute account of the life and activities of these wonderful craftsmen, who have never been surpassed as quarriers and workers of stone. These records are found in wall carvings and paintings. Some of these show the transportation of the monster shafts of stone that were used for obelisks or statues. The monoliths were built into a wooden cylinder framework and rolled to their destination, the motive power being supplied by hundreds of slaves harnessed to ropes. It would be interesting to know whether the Texas quarryman copied his idea from the workmen of 3,000 years ago, or evolved it himself.

Granite Production of New Hampshire

According to figures reported to G. F. Loughlin, of the United States Geological Survey, New Hampshire ranks as the sixth State in value of granite produced in 1916. The stone marketed was valued at $1,141,810, a decrease of over 7 per cent compared with 1915. There were 28 producing quarries, 6 less than in 1915, and the distribution of stone according to uses was as follows:

Building: Rough, 128,062 cubic feet, $58,441;

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dressed, 170,729 cubic feet, $436,954. Monumental: Rough, 76,625 cubic feet, $56,019; dressed, 45,311 cubic feet, $210,170. Paving blocks, 5,487M, $247,177; curbing and flagging, 187,564 square feet, $79,636; crushed stone, 25,596 short tons, $22,431; other stone, $30,982.

Rough building stone decreased about 2 per cent in quantity and 15 per cent in value. The average price was 46 cents a cubic foot in 1916, 7 cents less than in 1915. Hillsboro County (Milford) produces over 88 per cent of this stone. Dressed building stone decreased 23 per cent in quantity and 20 per per cent in value. Concord, Merrimack County, produced 84 per cent of the output. Marlboro and Fitzwilliam, Cheshire County, usually makes a considerable output of dressed building stone, but in 1916 the output of this county showed a large decrease. The average price per cubic foot in 1916 was $2.56. Rough and dressed monumental stone decreased respectively 13 and 27 per cent in quantity and 10 and 14 per cent in value. Carroll and Merrimack counties together and Hillsboro County produced in about equal quantities 84 per cent of this stone. The average price was 73 cents for rough and $4.64 for dressed stone.

The production of paving blocks increased 29 per cent in quantity and 20 per cent in value. The average price was $45.05 in 1916, $3.36 less than in 1915. Over half of the output was from Hillsboro County and over one-fourth from Merrimack County. Curbing and flagging decreased in quantity but increased in value. The average price was 43 cents per square foot in 1916, an increase of 6 cents over 1915.

The producing localities were Redstone, Carroll County; Warren, Grafton County, where a mica schist is quarried and crushed into chicken grit; Fitzwilliam and Marlboro, Cheshire County; Milford, Hillsboro County, and Concord and Suncook, Merrimack County. Hillsboro County produced over 36 per cent of the total, Carroll, Grafton and Merrimack counties over 51 per cent. Cheshire County, which in 1915 produced over 28 per cent of the total, produced only 13 per cent in 1916. The slump in this county therefore was the entire cause of the decrease of the State.

Care in Highway Maintenance

The road builders of this country can not learn much from the English in the matter of highway construction, but they can profit by observing the method of maintenance in England, according to W. D. Sohier, Chairman of the Massachusetts Highway Commission, who has recently returned from a trip to the British Isles.

Mr. Sohier went to England for a trip of inspection of about 1,000 miles through northern England, the lake region and Wales. In the northern region he traveled the Great Northern and said the feature of this is the perfect smoothness. In the entire 1,000 miles he traveled he says that he did not find more than three or four miles as rough as the average city street in this country. Bumps and ruts were absent. There was no bounce when a car passed over steel rails or manholes, this being the result of the engineers laying wood block pavement flush with the rails of street car tracks and preventing ruts and holes. They have succeeded also in laying tar macadam surfacing flush with the rails, and the motor car passes over the tracks with no unpleasant motion. These two methods have been considered as nearly impossible in American cities.

In the opinion of Mr. Sohier, the smoothness of English roads does not come from superior skill of the English engineers and workmen, not from better materials, but is a result of constant repair and resurfacing. In one day's trip on the Great Northern Road he met eight or nine gangs of repairmen working with 14 steam rollers and numerous gangs of three or four men with little tar kettles filling small breaks in the road surface as quickly as they appeared with crushed stone or slag and stone. They did excellent work on these small repairs, the car passing over a patch with no jounce. All along the road are little piles of stone or slag for minor repairs.

On the tar macadam and the wood block streets and roads there are no crosswalks to cause jounces, and the manholes are made flat. The roads are macadamized from shoulder to shoulder and the gutters are paved. The English are not building concrete roads, but they are using concrete as a foundation for wood block pavement. In the lake district there are excellent gravel roads as well as tar macadam. The English have learned to handle tar on highway surface better, as well as in maintenance.

The discussion of a year ago regarding accidents has

JAMES H. MANNING MAUSOLEUM AT ALBANY, N. Y.
Exterior entirely of pink Westerly granite and interior finish in pink Tennessee marble

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subsided. According to Mr. Sohier there is very little speeding on British roads, motors often being driven faster on city streets than on country roads. In some city streets, where the police regulate traffic, the taxis make 30 miles an hour in blocks between cross streets. On the country roads the average motorist does not exceed 25 to 28 miles an hour. The rules of the road are carefully followed, and a number of automobile societies keep patrolmen on the streets to give advice and assistance to members on the road.

Unsightly Cracks in Concrete Stone

Some of the very best and strongest arguments against the cheap substitutes for natural stone are furnished by the most ardent advocates of those materials. They discuss in the trade papers the defects that manifest themselves in practice, in the hope of discovering some remedy. The president of a company manufacturing concrete stone makes the following frank admissions in an article contributed to a recent number of the *Cement and Engineering News:*

"Surface cracks or crazing in concrete are matters which have long vexed manufacturers of concrete stone, and I believe I am safe in saying, with our present knowledge and methods of manufacture, they are a feature which can never be absolutely eliminated. With proper care and surface treatment, however, I believe that crazing, while it can never be absolutely eradicated as long as the concrete eis exposed to the elements, can be overcome to such an extent as to render it practically unnoticeable.

"Crazing is apparently caused by changes in temperature, resulting in uneven expansion and contraction on the surface as compared with those portions nearer the center. In making concrete stone a thin skin of cement mortar is formed on the surface which is much richer in cement than that forming the body of the concrete.

"These two materials have different coefficients of expansion and, because of this fact, varying changes in temperature cause "hair cracks" to appear. These are particularly marked on a surface which has been troweled to any extent, thereby bringing an excess of cement and finer materials to the top. On a surface treated in this manner, the crazing appears more rapidly and to a much greater extent.

"Structurally these cracks are practically harmless, since they seldom extend into the stone more than 1-32 inch. But when they become full of dirt, as they invariably do, they result in a very unsightly appearance.

"Crazing, when it has once occurred, is most difficult to rectify by anything short of removing the entire surface. The writer has completely removed all crazing from concrete stone with wire brushes, only to have the same cracks appear in the same place in two or three days' time. I have also applied a fine mixture of beeswax, paraffin and benzine to the surface when they are absolutely dry. This mixture does not discolor the stone and penetrates to the depth of about ½ inch. This treatment, however, is at best only temporary and but postpones the evil day when the crazing appears."

After declaring that the crazing varies as to the size of the aggregate used and the surface finish employed, the writer goes on as follows: "The only permanent remedy, which, while it does not entirely eliminate crazing, reduces it to such an extent as to render it unobjectionable, I have found, is to remove completely the thin skin of cement from all exposed surfaces. This may be done in various ways and either while the concrete is still green or after it becomes hard. While the concrete is still green it may be washed with a thin solution of hydrochloric acid and then rinsed off with clear water, or the surface may be cut down with hand scrapers or wire brushes. These methods, however, have been found to disturb the aggregates and the final result is not so pleasing as may be secured if this thin skin is removed after the stone becomes hard. There are various methods in vogue for re-cutting this surface, the most practical of which I have found are either by means of sand blast, carborundum machines or pneumatic tools. These two latter methods entirely remove the surface skin and expose the aggregate, thus greatly improving the appearance of the stone. Unfortunately, this treatment is rather expensive and but a small percentage of concrete stone users are sufficiently educated or conversant with conditions to appreciate the superiority and necessarily higher cost of a stone treated in this manner."

Largest Parish Church in Great Britain

St. Michael's, Coventry, claims to be the largest parish church in the British Isles. Of cathedral-like proportions, with a steeple only exceeded in height by those of Salisbury and Norwich Cathedrals, St. Michael's, Coventry, is 293 feet long and 127 feet wide, compared with 230 feet by 108 feet, the dimensions of the parish church of Great Yarmouth, which is sometimes cited as the biggest parish church. The Coventry church—which was constituted a collegiate church in 1908, with a view to its becoming the cathedral of a new diocese—dates from the fourteenth century, and no less an authority than Sir Christopher Wren acclaimed it as one of the noblest works of the great Gothic architects of the Middle Ages.

Building Stone in Argentina

Although there are comparatively rich deposits of fine building stone and granite in this country, yet up to the present, due to lack of capital and initiative, the exploitation of these resources has generally been on a primitive scale, writes Consul General W. Henry Robertson, from Buenos Aires. One quarry employs over 15,000 men, but such machinery as cranes for handling, automatic boring tools,

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hammers, etc., are used, but in a very limited way. These primitive methods have been the occasion of a high production cost and at the same time have restricted the output of the quarries. In a word, this industry has not been developed to a great extent here.

Only a limited amount of high-class stone and granite is used in the construction of buildings here. The smaller one-story buildings are all built of a soft red brick, which is produced in abundance. This is covered with a light cement-plaster facing, making the exterior appearance one of freestone. These one-story buildings are used extensively for residential purposes, and outside of the larger cities very few other classes of buildings are erected. Higher buildings are erected for apartment and business houses and private residences of the wealthier classes, but they are mostly built with a steel frame and brick walls, faced on the exterior with a light cement plaster. On some buildings stone, granite or marble slabs are used for facing the street wall up to the first-story windows. The recently erected Medical School of the University of Buenos Aires has entire granite blacks as a base, but, in general, it is the custom to use only slabs of marble, stone or granite as ornaments rather than to give strength to the structure. All the Government buildings here are built of steel and red brick, with the cement facing.

Prior to the war quantities of granite for paving purposes were brought as ballast from Norway and Sweden. The present freight rates make it out of the question for foreign marble, stone and granite to compete with the local product. It would be necessary for American exporters who desire to enter this market to have a representative visit this country and to bring with him samples of the various kinds of stone. He could then keep closely in touch with the building trades, offer bids when they are called for, especially in the case of the large public buildings, etc. Since 1913 building operations have been very limited.

Great Army Building Program

Many new construction projects for the army, including munition plants, ordnance depots, storage plants, port terminals, hospitals, aviation work, cantonments and housing were disclosed in a statement given the Senate Military Committee recently by the War Department. The work will cost a total of $268,650,000, and while some of the projects have been announced before, in most cases the location and cost have not been given.

The statement shows that $37,000,000 will be spent in building a gas-making plant at Edgewood, N. J., while forty interior storage depots, to cost an aggregate of $30,000,000, are to be erected at unnamed points. On aviation work, including a new cantonment the location of which was not given, $46,000,000 will be expended. Ordnance depots are to be built on the South Atlantic Coast and at some seaport at a cost of $4,000,000 each, and one on the Middle Atlantic Coast at a cost of $6,000,000. An ammunition depot at some seaport is to cost $7,500,000, and a like sum is to be expended for an ordnance depot in Central Pennsylvania.

Hospitals for soldiers suffering from tuberculosis are to be built at Denver, Col., and Asheville, N. C., at a cost of $500,000 each, and $12,800,000 is to be spent on hospitals at thirty-two army training camps. A division cantonment for the regular army is to cost $8,000,000, but its location was not given. It may take the place of the regular army training camp at Charlotte, N. C., which soon is to be abandoned because of the unsuitability of the ground on which it is located.

Eight million dollars will be spent on a port terminal at Boston, and $10,000,000 on a similar terminal at Charleston, S. C. Two million dollars is provided for three powder bag loading points at sites not yet selected. For housing the Shipping Board to relieve congestion in shipyard communities the department plans to expend $35,000,000.

Stone Crushers for New Zealand

The Thames County Council has authorized the investment of $24,332 in quarry equipment and appliances for the production of crushed stone to be used in the development of better roads in that county, writes Consul General Alfred A. Winslow from Auckland. Communications addressed to the chairman of the County Council at Thames, New Zealand, will reach the right parties in connection with this development. This is probably the beginning of many other similar undertakings in different parts of New Zealand, for there seems to be a determined move in favor of better roads for the country.

Small Price for An Historic House

A fifteenth-century house in Nicholas Street, Ipswich, England, in which the father of Cardinal Wolsey lived, and in which the Cardinal was born, was sold by auction for about $5,000. At the entrance to the house is an old Tuder corner-post, the finest and most ancient in the borough.

Time of Falling Stone

The time a stone would require to fall the 4,000 miles to the center of the earth has been calculated for the Paris Academy of Sciences by M. Sanger. Considering the influence of the varying density of the earth, he finds the time would be 19 minutes, 15 seconds, but if the mean density is assumed to be the condition, the time will be 79 seconds greater.

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STONE

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CHAMBERS of commerce, boards of trade and local associations of manufacturers throughout the country can be of material help in relieving transportation congestion by furnishing to the highway departments of their respective states data as to the highways which can be most useful as substitutes for congested railway routes. This can be done by calling meetings of the traffic managers of the industries, and having them, through a committee, determine the public roads whose maintenance and improvement is most important.

IN order to meet the growing menace of the freight transportation situation, a National Highway Committee has been appointed with Roy D. Chapin, president of the Hudson Motor Car Company, as its head, and the Board of National Waterways Association is working with the official committee on this problem. Suggestions are made that business interests everywhere co-operate in a whole-hearted way to make the best of the situation and to foster every effort looking toward improvement. The various industries are urged to work for the betterment of paved highways and their maintenance in the best condition; to load and unload railroad cars promptly and to their full capacity; to use motor trucks for deliveries where possible, and not to use trucks of larger capacity than are required for the load carried. It will be remembered that several months ago a concerted effort was made in the limestone district to load every car to its full capacity, and that this released many hundreds of cars for other traffic. The stone men can be trusted to do all in their power to aid the government in this emergency.

THE war has given a great stimulus to the mineral industry of Missouri. The total production in 1916, according to figures compiled by the Missouri Geological Survey, was by far the greatest in the history of the state, reaching the enormous total of $78,558,422. Lead and zinc ore, produced in nearly equal value, account for about two-thirds of the grand total, but nearly all of the minerals showed an advance. The output, as a whole, has almost doubled in value in two years. The value of the building stone produced in 1916 amounted to $2,278,742. Prof. H. A. Buehler, the State Geologist, in commenting upon the statistics just made public, calls attention to the fact that the state is an important producer of marble for interior decoration. It may take the country some time to adjust itself to the violent disarrangements that are bound to follow entrance into war, but it is certain that our mineral industry will make immense strides in the near future. Even those states which do not produce metals used in war work ,as does Missouri, will gain in the end, because the interruption to ocean traffic has made it imperative that we develop our own resources wherever possible.

ACCORDING to a report on the labor market in January, issued by the New York State Department of Labor, the stone, clay and glass products group reported a decrease of 10 per cent. in the number of employees since December. For this same period there is indicated by the figures submitted, a decrease of 15 per cent. in the wage volume. Miscellaneous stone was the only industry that showed an increase in activity. The greatest decreased activity in the group was experienced in the lime, cement and plaster industry, which showed a loss of 30 per cent. in the number of employees, due largely to shutdowns on account of the cold weather and the lack of coal. When compared with January, 1917, the group as a whole had 11 per cent. fewer workers and paid 2 per cent. less in total wages. The building department of the ten first and second class cities in the State reported that the estimated cost of building operations for which permits were issued in January was 15 per cent. less than in December. In Utica no permits were issued. Albany was the only city that had an increase over the operations for December. As compared with January, 1917, there was a decrease of 47 per cent.

THERE is no doubt that upon the conclusion of peace this country will enter upon a period of unexampled industrial prosperity. If necessary shipping were available we could even now command the markets of the world. Our shipbuilding programme is being speeded up, and before the war is ended we shall have the greatest merchant marine in our history. Every one recognizes what this means in fostering foreign trade. One result of the business boom will be tremendous building activity. The shortage in housing accommodations has become alarming, and adequate steps have already been taken to remedy existing conditions. While general building has been held in abeyance, this cannot long continue, and before many

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months quarries and cut-stone plants will have more work than they can handle. There can be no question about this, so it behooves every one in the industry to be ready to meet the coming demand. If there is any dullness at present it is just the time to put plants in order and make betterments. New beds of stone should be stripped so that channelers can begin operations as soon as the opportunity offers. All machinery and equipment should be overhauled and replaced if it is out of date and ineffective. Adequate power plants should be installed if the existing ones have already been overtaxed. The operators who are foresighted enough to make preparations in advance are the ones who will capture the major part of the trade.

What Are "Non-Essential" Industries

THE proposition that has been so widely discussed to limit, during the progress of the war, the so-called "non-essential industries" has naturally led to much speculation and anxiety. Business men in general want to know with whom shall rest the decision as to which industries may be regarded as essential. The suggestion has been made by some government officials that building operations shall be confined to structures that are absolutely necessary, and again the question arises as to what shall be the basis of judgment. If we shall do no building except strictly for war purposes, one of the greatest industries of the country will be dealt a blow from which it cannot recover for years, if, indeed, it is not absolutely wiped out. The situation is one that we must confront, and there is no problem more weighty now before us.

Director of Conservation P. B. Noyes, of the United States Fuel Administration, says: There are no "non-essential industries." Industries which do not minister to human safety, comfort or happiness fail to survive. Certainly no industries are non-essential to the workmen engaged therein. This false nomenclature, suggesting something unimportant to the nation at large, led to a hasty assumption in fairly influential quarters that the so-called "non-essential industries" can be properly "swept from the board," to make room for the war game. For a moment, the fact was overlooked that ten million workers are dependent on these "non-essential industries"; and that thirty-five to fifty billions of the country's capital is tied up in their operation, and that with a structure so interdependent as the modern industrial and fiscal systems, one has only to attack the business community in the spirit of: "Cut off the non-essential industries" to insure a crash accompanied by the most widespread unemployment and insolvency ever experienced in this country.

Mr. Noyes endorses a plan that has been worked out in conjunction with representatives of a large number of industries. The plan is this: It has been defined as a "voluntary limitation of the least essential portion of each existing industry," first, by agreement with such industry, or a majority of those engaged in it, and then having obtained this majority assent, restriction by government order. The order is necessary for two reasons. In the first place, participation by the Government makes such arrangements legal; and in the second place, where there are many manufacturers in a given industry few dare restrict unless in some way assued that all their competitors must restrict also.

The War Committee of the Chamber of Commerce of the United States, in commenting upon this plan, says that it has already been tried out enough to prove its practicability. In each case the industry has given its heartiest support and shown its desire to co-operate with the Government in every possible manner. The voluntary saving shown by the industries already called into conference promises to be 15 million tons of coal.

The Commercial Economy Board of the Council of National Defense has undertaken to co-operate with business men in eliminating, as the Government's requirements demand, needless uses of men, materials, equipment and capital in all lines of commercial business; in other words, to conserve commercial resources as necessary to meet the Government's need. Co-operation of business men with the Board is voluntary. The Board can not compel adherence to its recommendations by legal process. In fact, its purpose is to make such compulsion unnecessary. It works on the theory that there are considerable needless uses of labor, materials, equipment and capital in all businesses, and that by forehanded action and with voluntary co-operation from business men enough of these uses can in most cases be eliminated to meet government requirements without resorting to more drastic methods.

Red Cross Appeal for Old Tracing Cloth

American manufacturers, architects and all draftsmen are called upon to render an important service to their country. When the workman has finished with the piece of cotton or linen cloth used in his trade, it is flung aside to be destroyed. The Red Cross is asking now for that discarded material. All over the country thousands of women are earnestly engaged in the manufacture of surgical dressings to be used in the hospitals for our wounded soldiers and sailors. The problem of getting enough white goods for this work is enormous. As long as the war goes on the work must go on if we are to live up to the humanitarian ideals typified to the world today by the Red Cross.

Two kinds of cloth are available—draftsman's tracing cloth and old linen and cotton articles to be donated from private households and, often in large quantities, from hotels. These can be easily collected and handled by the modern laundries, which have now been called upon to perform this work for the Red Cross. With their facilities for collecting, washing, sterilizing and delivering to the local chapters, the laundries are in a position to perform an invaluable service and the least that other trades can do is to help them in every way.

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If any manufacturer, architect or draftsman will go to the slight trouble of calling up either the local Laundry Owners' Association or one of the large laundries of his city, he will find them only too glad to send for such cloth as he can give them. The tracing cloth is washed and softened and all ink marks removed, so that it becomes suitable for bandages and surgical dressings. Stone plants may have much of this material on hand which they could spare.

Jade and Granite in Burma

According to a United States consular report from Burma, Jadeite or Burmese jade is obtained by the Chinese in the Myitkyina district and carried to Yunnan. During the past four years the output has remained nearly constant—164 tons in 1913, 188 tons in 1914, 183 tons in 1915, and 189 tons in 1916—but the value has suffered a great decline. The principal building material exploited in Burma is granite, the amount of which rose from 122,000 tons in 1915 to 219,000 tons in 1916, and the value from $48,665 to $89,219. The chief road materials are laterite, of which 228,000 tons, valued at $97,330, were produced in 1915, and 222,000 tons, valued at $81,108, in 1916; and gravel, represented by 108,000 and 105,000 tons, valued, respectively, at $22,386 and $19,142. These are found in practically all parts of Burma, but particularly in the Thaton-Tavoy region.

Raking Mouldings on Internal Angles

THE various sections of a moulding running round the interior angles of a wall are illustrated in Fig. 1. It also shows the different forms of sash-bar moulding required for a certain kind of lantern light, and the shape of the angle bar in a shop front. A. B. is the section given or known. Points 1, 2, 3, etc., are taken in the profile, the points in the curved portions being taken sufficiently close to admit of a free-hand curve being drawn through the resulting points. A′ B′ and A″ B″ shown in diagram below are the sections of the mouldings mitreing into the raking one, which are horizontal.

When the moudings on both faces of the wall are on the rake or at an angle, one of the methods illustrated at the right of the figure is adopted. In one case the points on the profile are projected to the back line of the section, and lines are drawn from these at the angle to which the moulding is to be fixed. A new back line is then drawn across these lines and at right angles to them. A line is now drawn from one of the front points, say A″, at the new rake of the moulding. By drawing the projection line F L, and lines through the points in it, the point A‴ is found. Join this to the end of the new back line, and draw lines parallel to it from the other points in the line. The intersectons of these lines, with those drawn through the line F L, are points on the new section.

The other method, which is the shorter when the elevation of the mitre (A″ B″) has been drawn, is by drawing lines from the points on the profile, and at the rake of the moulding to intersect the corresponding lines drawn through the projection line.

The elevations and plan of the most difficult case of taking mouldings are shown in Figs. 2 and 3. It is when both pieces are slanting, and the angle of the walls is oblique. A B C is the given section, D E the elevation of the corner of the wall, D′ H′ the plan of the mitre. Project a line up from H′ and draw a line through B to meet it at H. Join D H, which is the elevation of the mitre line on the top surface of the moulding. It is necessary to draw an elevation of the moulding on the other face of he wall. Draw D′ E′ parallel to D E, and project H H′ across, making the distance of H′ from D′ E′ equal to the distance between H and D E. Draw H′ B′ through H′ at the rake of the moulding. Draw lines D′ A′, E′ C′ parallel to this. Draw A′ C′ at right angles to H′ B′. Take points in the profile A B C, and project them to the projection line. Draw also lines

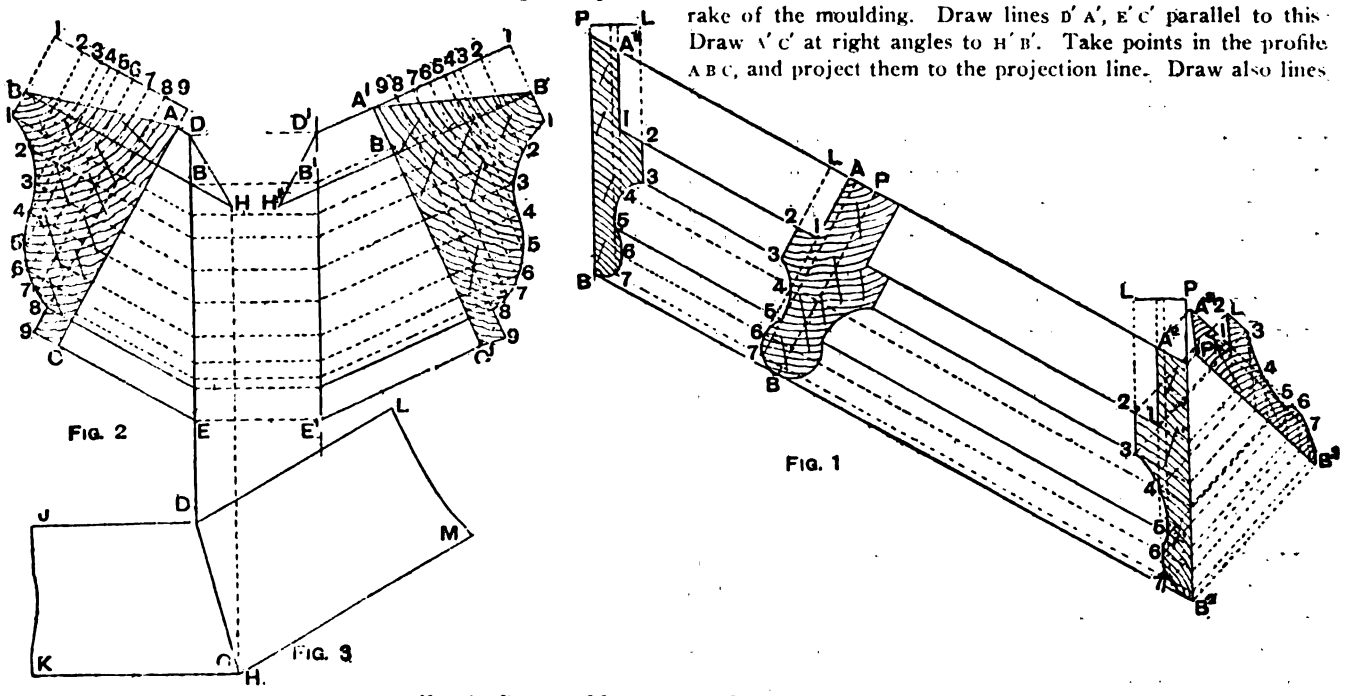

FIG. 1—RAKING MOLDINGS ON INTERNAL ANGLES
Figs. 2 and 3 show the raking molding on the oblique angle of the wall

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through them parallel to B H to meet D E. From the points in D E draw lines to D' E' at right angles to it. And from the points obtained in D' E' draw lines parallel to H' B' to meet the line A' C' From the point in A' C' where the line drawn through B and projected across meets it, draw a line to B'. Draw lines from the other points in A' C' parallell to B B'. Draw the projection line A' 1 in the manner described above, and project lines from the points in it parallel to A' C'. The intersections of these lines with those drawn from the points in A' C' are points on the required section A' B' C'.

Big Building for the Navy

The new structure to be built for the United States Navy Department on the Bush Terminal property in South Brooklyn will, it is said, be the largest business structure in the City of New York. It will be 700 by 1,280 feet and eight stories in height. It will be practically fireproof, and will cost $10,000,000. It will have a floor space of 7,168,000 square feet, or over 165 acres. This building will be used for the storage of naval supplies and for the manufacturing, packing and shipping of goods for United States war vessels.

Obituary Notes

Joseph H. Vogel, a prominent Quincy granite manufacturer, died the past month at the age of seventy-six years. Mr. Vogel was born in Boston, but removed to Quincy when a young man and entered the granite business with his father as a member of the firm of Vogel & Sons. Latter he entered business for himself, and continued this until his death.

Thomas Connelly, a well-known stone man of Syracuse, died the past month after a brief illness.

After an illness of nearly a year, Christian H. Jessen, a well-known stone man of Troy, N. Y., died the past month. Mr. Jessen was born in Denmark, but had been a resident of this country for 33 years.

Notes from the Stone Fields

MARBLE AND GRANITE

E. A. Mundt & Sons, of Marinette, Wis., have taken over the Menominee Granite Works, on Stephenson Avenue, Menominee, and is now installing a complete pneumatic plant. The works were formerly run by R. C. Smith, but have not been in active operation for some time.

The plant of the Camden Marble Works, at Camden, Ark., which was destroyed by fire recently, is being rebuilt by E. P. Clouse.

The new building of the *Tribune* at Oakland, Cal., is nearing completion, the interior marble work having been placed in position the past month. Alaskan marble is being used for the floor, counters and counter facings, wainscoting and column facing in the rotunda and main business office and for the lavatories and rest rooms throughout the building. Colorado Yule marble will be used for the entrance, marble pilasters and the large marble panel over the entrance carrying the bas relief of the heading of the Oakland *Tribune*.

Rapid improvement has been made in transportation facilities to the magnesite quarries in Stevens county, Wash., where four companies are operating. The Spokane Valley and Northern railroad has just completed its six-mile line to the fields of the American Mineral Production Company, near Valley. The road will be placed in immediate use. The new tramway of the Northwest Magnesite Company, extending five miles from the quarry to Chewelah, is in operation. The tramway has a capacity of 30 tons an hour, but this can be doubled by the addition of buckets. Two more tramways are being installed, one for the Valley Magnesite Company, the other for the American Minerals Production Company. The Valley tramway will connect the quarries with the kilns, half a mile apart, and the American Tramway will connect the quarries and kilns of the Red Marble quarry with the Spokane Valley & Northern railway, which are a mile apart.

The Wisconsin Granite Company has opened its stone crushing plant at Sioux Falls, S. D., with a force of 15 men. The company has a lot of orders ahead for crushed rock, and the crushers will be kept running full capacity and time in order to meet dates for delivery. A great quantity of stone has been quarried and the quarry work will not be started for some time.

The Western Granite Company, a new incorporation, the outgrowth of the old Black Hills Granite Company, has been formed and has opened a shop on Main Street, Rapid City, S. D. The company has already received a shipment of Vermont granite for monumental work.

A peculiar result of the war is that there will be no imported black marble for many years The reason is that all this black marble came from Belgium. When the German armies invaded Belgium in 1914 and brought their mammoth Austrian forty-two centimeter guns, they had already mapped the country with the utmost care, and had realized the value of the marble quarry pits for gun emplacements. In the reduction of the fortresses in Belgium and Northern France these quarry pits served their purpose as gun emplacements. But the marble beneath was cracked and shattered by the massive impact and shock of firing the great weapons, and will be useless for building purposes even after the war. Fortunately this country has an abundant supply of black marble of the highest grade, and some of this is now on the market.

LIMESTONE AND SANDSTONE

A representative of the Ordnance Department of the United States War Department has inspected the big plants of the Indiana limestone districts in Monroe and Lawrence Counties with the idea of learning whether they could be utilized for war purposes. The representative told the operators that he found the mills adapted to make certain kinds of war material, especially steel girder work, which is used extensively in building and ship construction, and also to do foundry work.

Plans have been prepared for a three-story limestone and brick private school at Pennsylvania Avenue and New Lots Road, Brooklyn, for the New Lots Talmud Torah Society. The plans are by Cohn Brothers.

The Climax stone mill, at Bedford, Ind., operated by the Ingalls Stone Company, was destroyed by fire recently. The loss is heavy and is partially covered by insurance.

To acquire limestone quarries, the Lawrence Portland Cement Company has purchased for $50,000 from the Annville Limestone Products Company 85 acres in Annville township, Lebanon County, Pa.

Renwick, Aspinwall & Tucker have prepared plans for a new banking building for the Dollar Savings Bank on 147th Street, near Third Avenue, New York. The building will be one-story high, will cost about $150,000, and will have a limestone exterior.

A Hebrew Institute building of sandstone and brick will be erected at Pottstown, Pa.

Mr. R. M. Richter, secretary of the Indiana Limestone Quarrymen's Association, delivered an illustrated lecture on "The Indiana Limestone Industry," before the Rochester Academy of Science the past month.

The Perry-Owens Stone Company, of Ellettsville, Ind., has received the first war contract awarded in Monroe County. The company has signed contracts with the Government to run its stone crusher to its full capacity this season. The crushed product goes to the glass factories for use in the manufacture of food containers.

The Consolidated Stone Company, of Bedford, has issued

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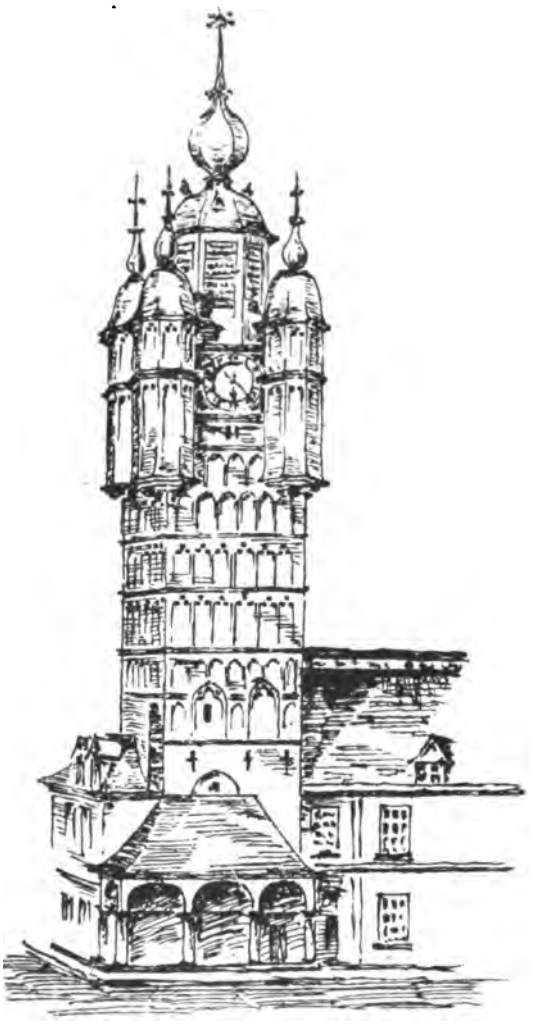
$400,000 of preferred stock, making the total capitalization $1,400,000.

Herbert J. Russell, for the past twenty-four years connected with the F. W. Wait Lime Company, of Glens Falls, New York, has just been made president of the company, succeeding F. W. Wait. For some time past he has been secretary and general manager. J. Irving Fowler succeeds Thomas S. Coolidge as vice-president. S. B. Goodman was re-elected treasurer and Russell M. L. Carson was elected to succeed Mr. Russell as secretary. Attorney Thomas B. Gilchrist, of New York, is the fifth director.

Business Brevities

Residents of northeast Minneapolis have started a fight against the granting of a building permit to the Minnesota Crushed Stone Company to rebuild its plant recently destroyed by fire.

The city of Baltimore has held up the awarding of contracts for $125,000 of street paving because of high prices.



THE BELFRY AT BURGUES, BELGIUM

Built in the sixteenth century. Ornamented with a row of blind lancers. Has a noted Carillon.

The Iron City Sand Company, of Pittsburgh, has elected the following officers: President, Harry G. Pfell; vice-president, Jacob Minsinger; treasurer, John W. Stolzenbach, and secretary, Howard G. Owens.

The Union Ship & Dock Company has taken over the property formerly owned by the Dyett Sand, Lime & Brick Company, at Port Jefferson, L. I.

The Wauwatosa Stone Company, of Wauwatosa, Wis., has increased its capital stock from $5,000 to $40,000.

The city of Manitowoc, Wis., claims to have made a profit in one year of $5,400 on its municipal gravel pit. The property cost only $2,200.

In Logan County, Ohio, J. Y. Wood confessed to setting fire to a stone crusher and was held for the grand jury. He sought to get $3,500 insurance by destroying $20,000 worth of property.

The Beloit Sand & Gravel Company's plant, at Beloit, Wis., recently purchased by I. Rubin, of Rockford, will be put in operation about the first of April, with complete modern machinery.

Lowery Brothers, of Syracuse, have purchased a property in that city and will develop a sand and gravel pit.

A. J. Blair, manager of the Lake Shore Stone Company, of Milwaukee, has been elected president of the newly formed National Crushed Stone Association.

Two hundred and fifty employees of the Marble Cliff Quarries Company went on a strike at the quarries near Columbus, Ohio, because of alleged favoritism by the management to Italians and Austrians. All the men who struck were Americans.

Fire of unknown origin destroyed the larger of two buildings of the York Hill Trap Rock Quarry Company'c plant at Westfield, two miles from Meriden, Conn. The loss was about $15,000, partially covered by insurance.

The North Western Railway Company has decided to abandon its quarry and crushing plant at Stockton, Minn.

Business Embarrassments

As the result of a friendly suit brought by Col. Andrew D. Baird, an involuntary petition in bankruptcy has been filed against his son, Andrew R. Baird, who, a year ago, took over the cut stone business of Andrew D. Baird & Sons, with a big plant at Wythe Avenue, Brooklyn. The liabilities are said to amount to about $20,000, with assets much more than sufficient to satisfy all creditors. The business was established before the Civil War by Robert Gill, but was reorganized by the latter and Col. Baird shortly after the war.

The Ware Sand & Gravel Company, of Cincinnati, O., has been adjudicated bankrupt.

New Companies

Galassi Marble & Slate Company, of Providence, R. I., to quarry and prepare for market marble and slate. Capital $15,000. Incorporators: Theodore V. Galassi, Margaret A Whelan, Providence, and A. Truman Patterson, East Providence, R. I.

Mississippi Sand & Gravel Company, of Delaware, to do a general contracting and construction business. Capital $1,000,000. Incorporators: C. L. Rimlinger, M. M. Clancy and F. A. Armstrong, all of Wilmington, Del.

The Charleston Crushed Stone Company, of Charleston, W. Va., to operate quarries in Kanawha County. Capital $25,000. Incorporators: N. K. Julian, H W. Abrahall, Andrew S. Yungman, James C. Tebbetts and Emily A. Quinn.

Argo Stone Company, of Chicago, to do a general stone business. Capital $250,000. Incorporators: George W. Lenzie, Eugene Blauvelt and Harold S. Tyler.

Association Meetings

The Iowa Marble & Granite Dealers' Association held its annual convention in Des Moines. The following officers were chosen: President, Joseph Salter, Bedford; vice-presidents, Carl Lane, Council Bluffs; J. A. Waddell, Marengo; R. A.

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Webster, Des Moines; J. A. Briar, Monona; secretary-treasurer, A. T. Gallagher, Corydon; directors, E. C. Dayton, Mason City; D. M. Dean, Harlan; O. D. Harding, Chariton; A. C. Delona, Fort Dodge.

At the annual meeting of the Retail Monument Dealers, of Connecticut, held in Hartford, the following officers were elected: President, Orville H. Ripley, Winsted; vice-president, Karl J. Beij, Hartford; secretary-treasurer, Peter J. Connerton, Hartford; executive committee, P. J. Breen, Hartford; W. H. Schittler, Danbury; S. W. Lucas, Bristol.

At the annual meeting of the Sand-Lime Brick Association, held in Buffalo, the following officers were elected: President, W. H. Crume, Dayton, Ohio; vice-president, W. D. MacFarlane, Winnipeg, Can.; treasurer, John L. Jackson, Dayton, Ohio; secretary, R. C. Kiser, Dayton; executive committee, H. W. Perry, Toronto, Can.; Irwin G. Toepfer, Milwaukee, Wis.; W. E. Plummer, Jr., Buffalo, N. Y.; W. J. Carmichael, Plant City, Fla.; L. W. Penfield, Willoughby, Ohio.

The Pennsylvania Retail Marble and Granite Dealers' Association, at its annual convention in Reading, chose the following officers for the ensuing year: President, George W. Colwell, Pittsburgh; vice-president, J. M. Gessler, Philadelphia; secretary, H. A. Mason, Erie; treasurer, H. M. Curry, Meadville; executive committee, E. E. Schaeffer, chairman, Kittanning; R. H. Koontz, Greensburg; A. H. Luckenbill, Middletown; convention committee, John D. Eisenbrown, chairman, Reading; Stanley Sullivan, Philadelphia; A. H. Luckenbill, Middletown; sergeant-at-arms, George E. Detweiler, Phoenixville. The next convention will be held in Pittsburgh.

Construction Notes

R. A. Kalfos, 207th Avenue, New York City, has prepared plans for a church and Sunday school for the St. George Greek Orthodox Church Society of Springfield, Mass. The building will cost about $100,000.

A $250,000 Government Sanitarium is to be built at Ninitte, Manitoba, Canada.

The Board of Education of Bridgeport, Conn., will erect a new school building at Prospect and Myrtle Avenues, to cost about $320,000.

A Sailors' Institute will be erected at Halifax, N. S., by the Naval League. It is expected to cost about $100,000.

L. R. Barnard, of New Rochelle, is preparing plans for a 21-story hotel building for J. J. Lannin at Seventh Avenue and Fifty-sixth Street, New York, to cost about $4,000,000.

St. Mary's Congregation, of McKee's Rocks, Pa., will erect a new church building after plans by J. H. Phillips, of that city.

State Architect F. H. Bent, of New Jersey, is preparing plans for an Attendant's Home at Trenton, N. J., to cost about $90,000.

Rochester, N. Y., is planning the erection of a new High School building, to cost about $500,000, and a junior High School building, to cost about the same sum. The plans for the latter building are by Gordon & Madden, of Rochester.

Young & Hansen, architects, of Salt Lake City, have prepared plans for a three-story building for the Latter-day Saints' University in that city.

The town of Union, N. J., will receive bids this month for the erection of a new grade school, to cost about $200,000. The plans are by J. D. Lugosch, 21 Bergenline Avenue, Union.

J. B. Hamme, of York, Pa., has prepared plans for a new dormitory at Hood College, Frederick, Md.

H. L. Stevens, 53 West Jackson Boulevard, Chicago, has prepared plans for the new $1,000,000 Grand Hotel at Billings, Montana.

Plans have been prepared for the erection of a new High School at Donna, Tex.

The town of West New York, N. J., will receive bids this month for the erection of a three-story grade school, to cost about $230,000. The plans are by W. Mayer, Jr., of that town.

Lakewood, Ohio, is having plans prepared by City Architect E. A. Fisher for a new City Hall.

Tyrie & Chapman, of Minneapolis, have prepared plans for a new three-story High School building, at Wilmar, Minn.

The Riverside Savings & Loan Company, of Rocky River, Ohio, will erect a new banking building.

E. Brielmayer & Sons, Milwaukee, have prepared for an addition to the hospital of the Sisters of the Sorrowful Mother at Washaba, Minn.

State Architect A. Peabody, of Madison, Wis., is preparing plans for a new building for the State Tuberculosis Sanitorium at Wales, Wis.

St. Ann's Congregation, Le Sueur, Minn., will erect a new church, of cut stone and brick, after plans by W. F. Keefe, St. Paul. It is expected the building will cost about $90,000.

Croft & Boermer, Minn., have prepared plans for a $150,000 school at Duluth, Minn.

J. A. Burner, McKnight Building, Minn., is preparing plans for a new Court House for Lincoln County, at Ivanhoe, Minn.

T. L. James, 185 Devonshire Street, Boston, is preparing plans for a seven-story banking building for the Warren

CHAPTER HOUSE AT YORK, ENGLAND
The only Gothic dome in existence, or a dome formed with pointed arches

Institute Savings Bank, on Park Street, in that city. The first two stories will be of limestone and the remaining stories of brick with limestone trimmings. The estimated cost is $200,000.

The Oddfellows of Albany, N. Y., are planning the erection of a temple to cost about $150,000. The plans are by Obenaus-Nicoll Company, of that city.

The Y. M. C. A. of Pendleton, Oregon, will erect a $100,000 building.

The First National Bank, of Greeley, Col., will rebuild its present structure, after plans by Roeschlaub & Culler, Denver.

Omaha, Neb., is planning the erection of a new High School building.

West Orange, N. J., will erect a new High School building, to cost about $150,000.

H. W. Jones, Minneapolis, has prepared plans for a new stone and brick church, costing about $100,000, for Christ Episcopal Church, in that city.

The Memphis Conference of the Methodist Church is undertaking a campaign for the raising of money to erect a Woman's College at Jackson, Tenn.

The Oliver Baptist Congregation, of South Dearborn and

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Twenty-seventh streets, Chicago, will erect a new church building, to cost about $120,000.

Minnesota will erect a State Normanl School, costing about $100,000, at Bemidji. The plans are by State Architect C. H. Johnston.

The Knights of Pythias, of Chicago, will erect a $250,000 temple.

H. J. Nurick has prepared plans for a $250,000 building for Beth Moses Hospital, on Willoughby Avenue, Brooklyn.

Coolidge & Hodgdon, 134 South La Salle Street, Chicago, have prepared plans for a new church for St. Paul Universalist congregation, of that city.

Parish & Schroeder, 278 Madison Avenue, New York, have prepared plans for a church and parish house for the Evangelical Lutheran Immanuel congregation, of Meriden, Conn.

The Union Trust Company of Denver, Colorado, will receive bids this month for the erection of a twelve-story banking building, after plans by H. J. Manning, of that city.

New Mexico is planning an addition to the State Capitol building at Santa Fé, to cost about $200,000.

Laconia, N. H., will build a new High School, costing $150,000, after plans by H. Dow, of that place.

The Y. W. C. A., of Wilmington, Del., will erect a five-story building, costing about $250,000, after plans by C. May, of that city.

The plans of Bannister & Schell, 67 Wall Street, New York, have been approved for the new Children's Court Building, to be erected on Schermerhorn Street, Brooklyn.

The First National Bank, of Florence, Ala., will erect a five-story office and banking building, to cost about $100,000.

The Second National Bank, of Minot, So. D., will erect a $250,000 banking and office building, after plans by A. Fraser, of that city.

R. R. Markley, of Harrisburg, has prepared plans for a new church for the United Brethren congregation of Carlisle, Pa.

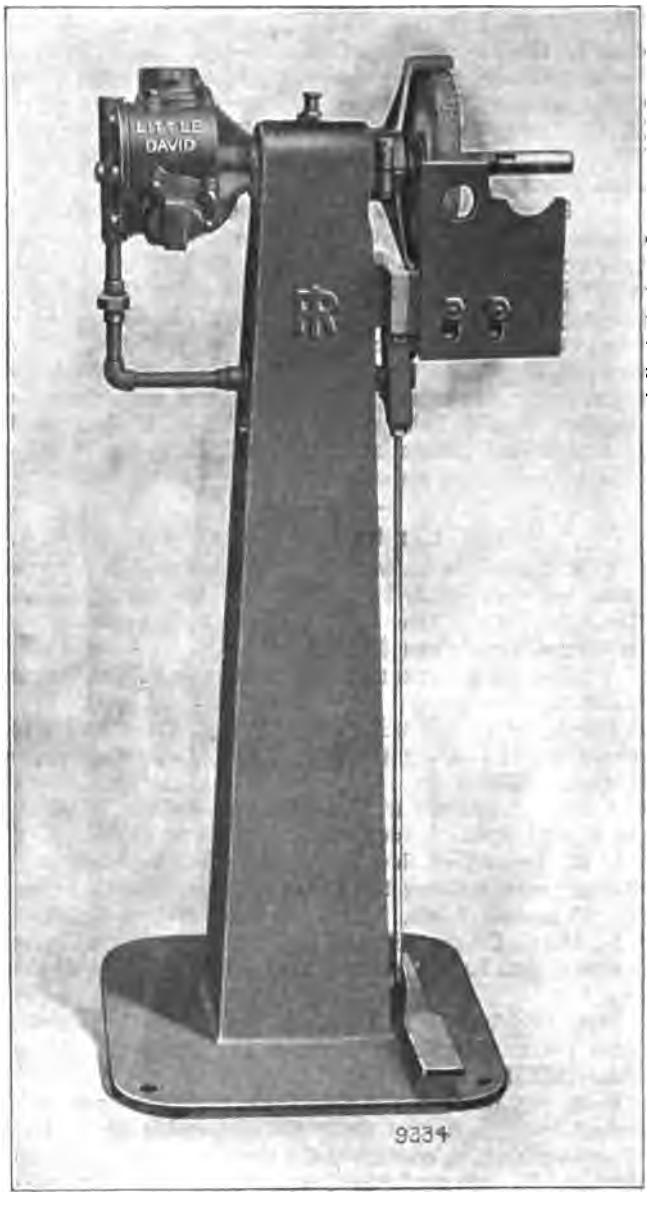
H. H. Waterson, 10 South La Salle Street, Chicago, has prepared plans for a $250,000 banking and office building for the First Merchants' National Bank, of Lafayette, Ind.

Trade Notes

The Tompkins-Kiel Marble Company, 205 Fifth Avenue, New York, announces that it has been appointed sole sales agent for the Sylvan Green marble quarries at Easton, Pa., and is prepared to furnish this material to the trade. The quarries have been shut down for a time, but have now resumed operations.

The Worthington Pump & Machinery Corporation announces the following appointments, effective from March 1: James E. Sague, vice-president, in charge of engineering and manufacture; Leon P. Fenstman, vice-president, in charge of general commercial affairs; Frank H. Jones, vice-president, in charge of sales; Edward T. Fishback, general sales manager; Charles E. Wilson, assistant general sales manager; William Goodman, assistant to vice-president; and William Schwanhausser, chief engineer, all with offices at 115 Broadway, New York, and Neil C. Lamont, manager of the Laidlaw Works, with office at the works, Elwood Place, Cincinnati, Ohio.

Giving adequate attention to the forming of bits and shanks on rock drill steels is in a large measure responsible for the attainment of better results from the drilling machines. Properly designed machine sharpeners forge both bits and shanks that are perfectly formed and accurately gauged. A punching machine enlarges the hole in hollow steels to its proper size. There remains but one thing, the squaring off of the drill shank. Imperfectly made shanks, that is, not properly square on the end, throw a strain on the hammer drill piston and are the chief cause of piston breakage. This is an expensive item not only in the cost of part replacement, but also in the time that the drilling machine is out of commission. Further, with imperfect shanks it is not possible to take advantage of the full force of the piston blow and drilling speed is retarded. As a blacksmith shop help in securing shank perfection, the Ingersoll-Rand Company has developed the "Little David" Pedestal Grinder. This, like the sharpener and punching machine, operates on compressed air. It is light in weight, readily portable and requires only a planking support. The powerful three-cylinder motor operates in a bath of oil. Power consumption is said to be very low. A



single foot lever controls the machine, leaving the blacksmith free to hold the steel with both hands. Ordinarily the grinding wheel used is 8 inches diameter and 1 inch face. As a further convenience the spindle is fitted with a No. 2 Morse Taper socket to take a rose reamer for counter inking the hole in the end of the shank. This operation guards against cutting the water tube of the drilling machine. The Little David Grinder also finds employment in truing the edges of drill bits, pointing picks and grinding other tools around the blacksmith shop. The complete machine weighs 195 pounds, is 44⅝ inches high and occupies a floor space 17 x 20¾ inches. It operates satisfactorily with air pressures of 60 to 100 pounds per square inch.

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Equipped with Carborundum teeth are "doing the work right" and doing it quickly.

Fred T. Ley & Company, contractors, selected one of these saws for use on the wonderful Deering residence now nearing completion at Miami, Florida.

The material was Coquina limestone, a very brittle, porous shell formation. There was a question about the quality of the joints.

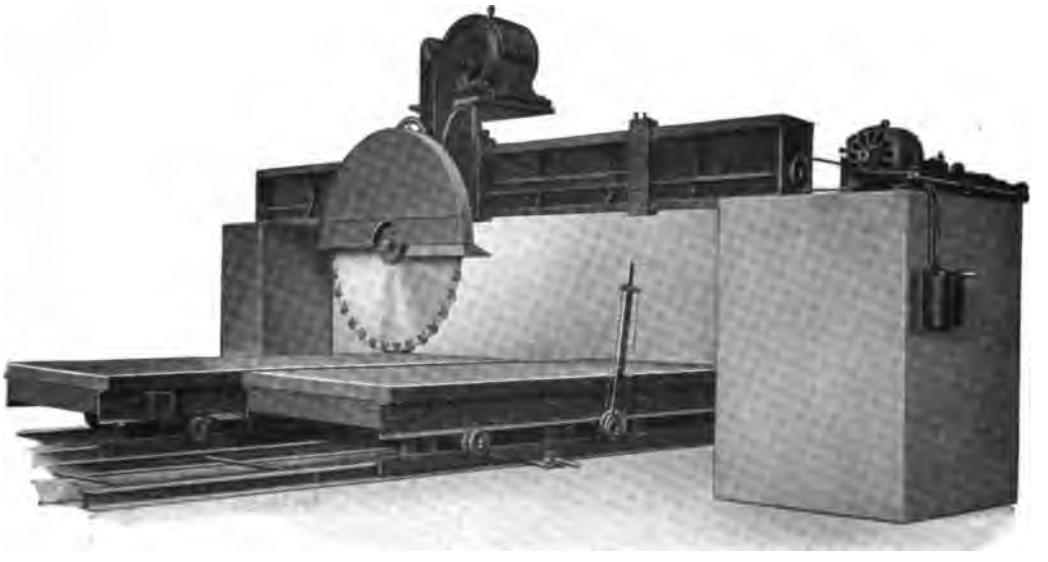
Our machine was installed and the question was answered.

A duplicate machine was ordered to be shipped within ten days, and sooner if possible.

Ernst Heldmaier, of Chicago, ordered one of these saws for a very particular contract for a large and elaborate Gothic ecclesiastical building now being completed in Chicago.

The joints had to be right on this job, and they were right.

The proper combination being our Niagara Saw—a rigid machine—plenty of power and Carborundum teeth.



This machine is especially adapted for jointing, but use it for ripping if you wish—just as well suited for this—rips 12′ 0″ long.

Cross rail weighs three tons, face 20″ deep, trucks 5′ x 12′, roller bearings, blades 36″, 48″ or 60″ in diameter, as required.

Note the motor, in back of the cross rail—balanced construction, no heavy overhung weight.

Belt driven as well as motor driven. Simple, easily operated; automatic stops, gear box for drive, positive, no frictions, no repairs.

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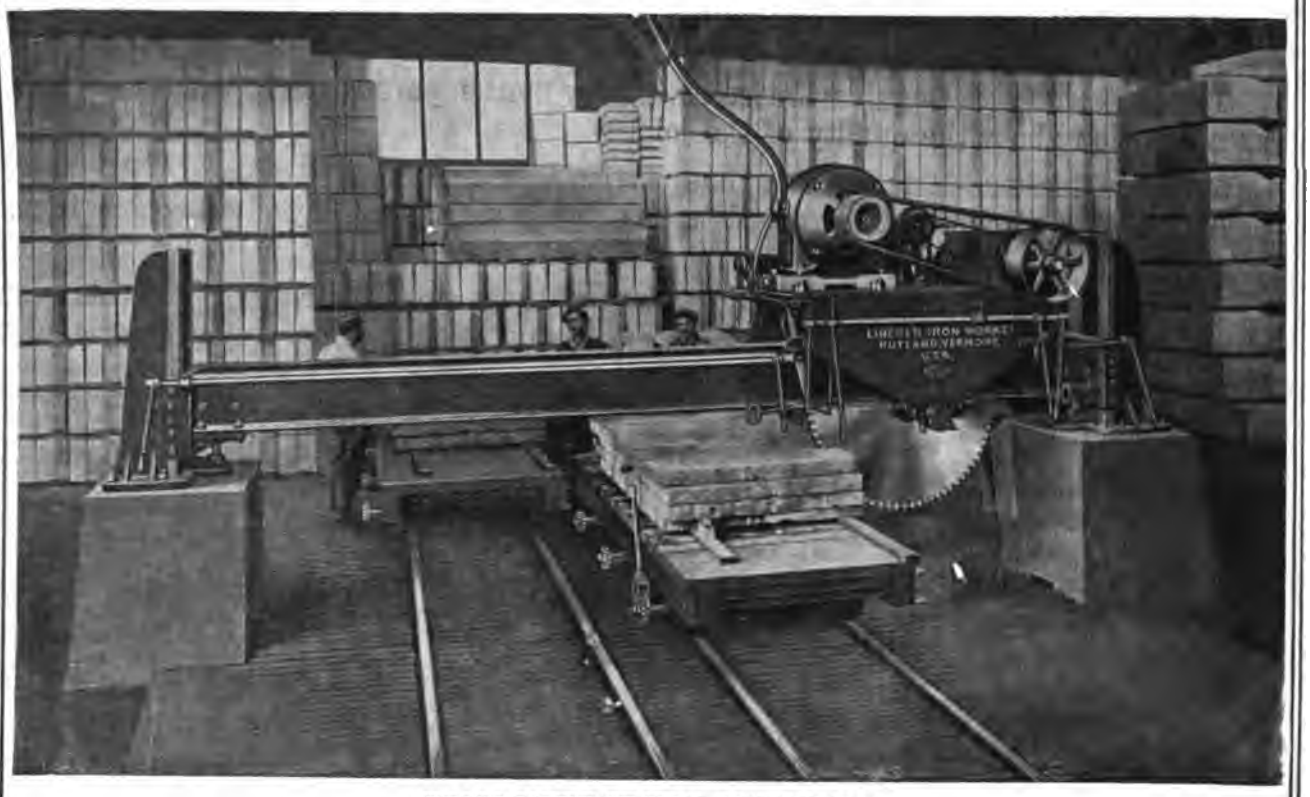

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Cut illustrates saw in operation in one of the largest stone finishing plants in the Bedford, Ind., district. The up-to-date **Diamond Saw** of merit, unequalled for simplicity and efficiency. All motions independent of each other and accomplished with a single motor. The operator has absolute control in any position. Built in all sizes and for all the various kinds of stone. Can be furnished with either diamond, splint AAA or carborundum teeth.

Stone Planing Machines furnished in all sizes. **All Lincoln Planers** are driven by the famous **Sellers Spiral Gears,** because this drive is better and more efficient than the worm drive.

Thomson Patent Circular Planing Attachment has no equal and can be applied to any type of planer. It takes care of any radius and the manufacture is controlled exclusively by us.

The Latest Improved Lincoln Screw Gang Saw has a number of new "Patent Applied For" features which appeal to the sawyer and make it the best gang saw ever built.

Lincoln Gang fitted with the **Thomson Parallel Motion Attachment** is the best and fastest cutting gang for granite and all the other building stones. It is built exclusively by us and makes the very best proposition for a **Diamond Gang.**

Genuine Wardwell Channeling Machinery. We own and control all the patents, drawings and patterns of the famous Steam Stone Cutter Company and are the only bona fide manufacturers of this machine. Recent tests show the **Electric Wardwell** vastly superior in all respects over all other types.

Carborundum Machines built in a variety of types and sizes. Our **Patent Applied For Combination Moulding and Coping Machine** has an unequalled cutting speed record.

Polishing Machines, built in five different sizes, have a recognized standard for quality and efficiency.

Rubbing Beds, in all sizes and with either overhead or underneath style gearing.

Special Stone Mill and Quarrying Machinery built to order. Correspond with us for information and details before placing orders. We are the **Pioneer** builders of stoneworking machinery and cheerfully offer you the full benefit of our long experience.

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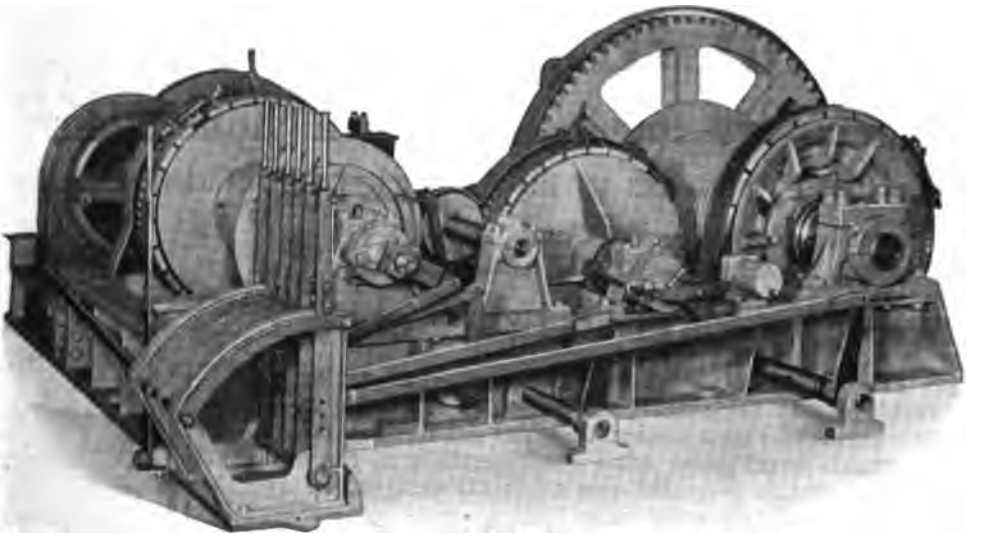

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Stand for economical, continuous Air Power service in quarry or shop. The perfect BALANCE of this type saves for useful work power otherwise wasted in overcoming friction and vibration.

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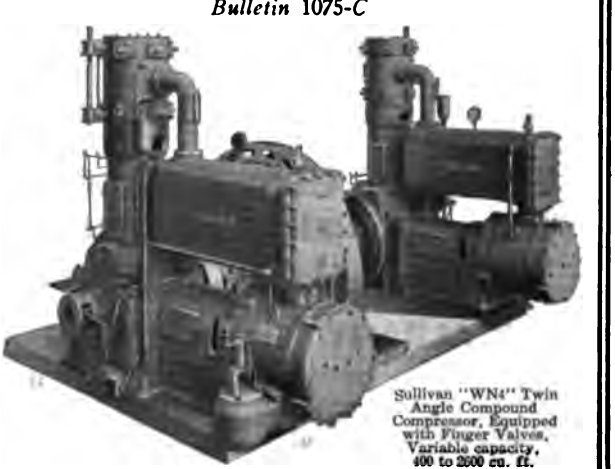

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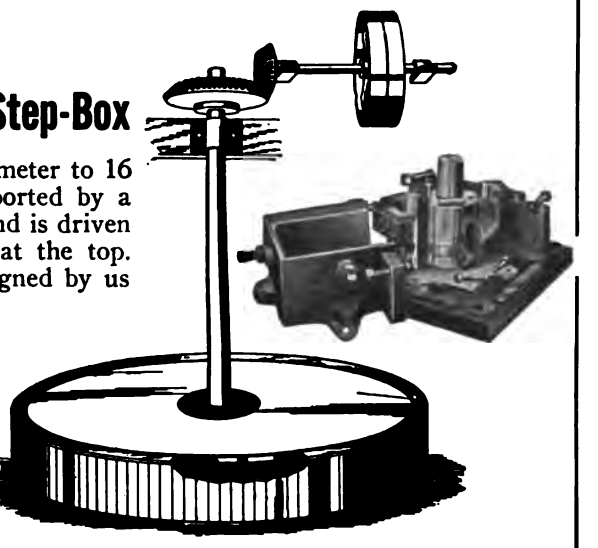
The platen is made of cast iron of any diameter to 16 feet, and any thickness. The platen is supported by a cast-iron spider on a vertical cast-iron shaft and is driven by mortis bevel gears from a countershaft at the top. The Adjustable Step-Box was especially designed by us for convenience in making needed repairs or cleaning. Besides being adjustable it is sectional and can be taken apart to remove the step without raising the entire bed. The step turns on disks of special bronze and steel, which will not heat readily and reduce the friction to a minimum.



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A book of 200 pages of indexed tables, showing at a single glance the cubic contents of any block of stone, according to its length, breadth and thickness.

A Necessity in Every Quarry and Stone Yard

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For Feeding Sand, Steel or Shot for SAWING STONE

Saws faster uses less sand and water and requires less power and repairs than any other. Runs only 20 revolutions per minute. Pays for itself in six months. Used by the Best and Largest mills. Send for full description and prices.

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Our "Special Brand" is the finest Pneumatic Tool Hose made—sizes 3/8", 1/2", and 3/4". Made expressly for the Stone Trade.

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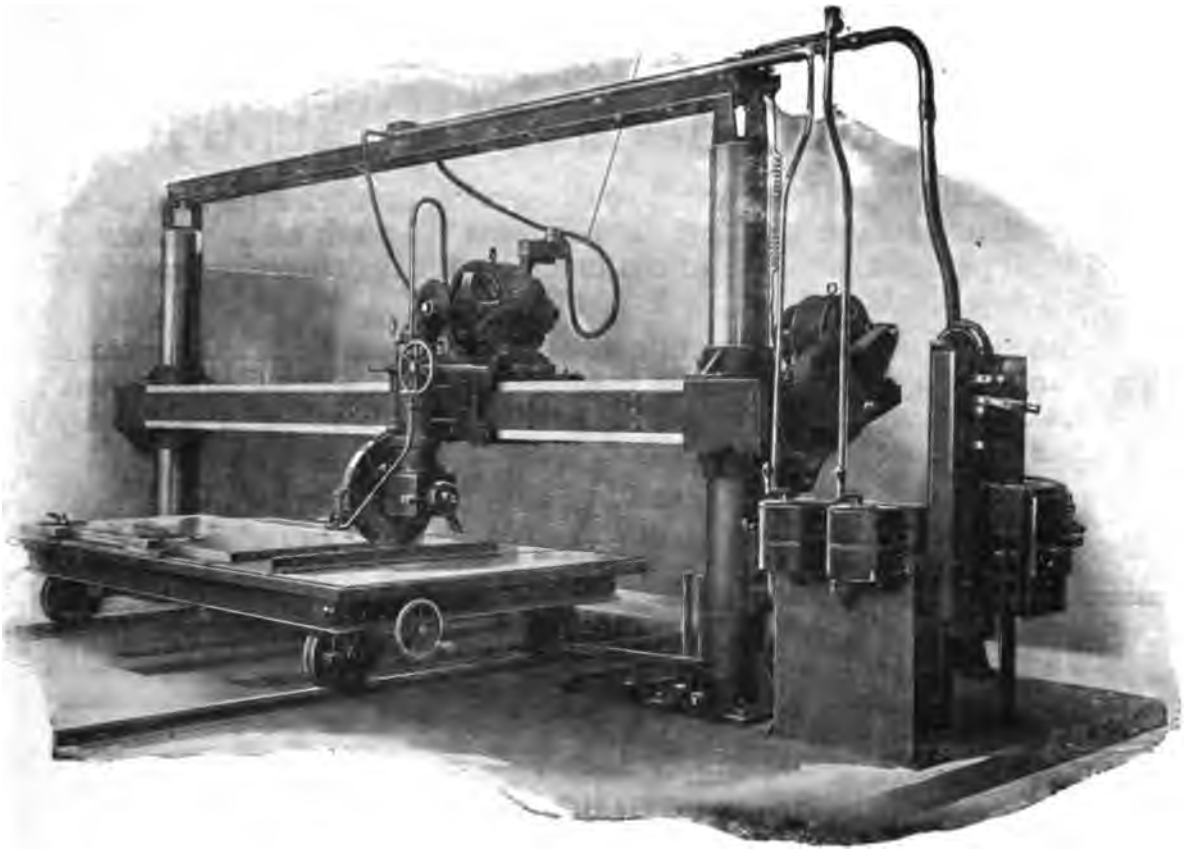

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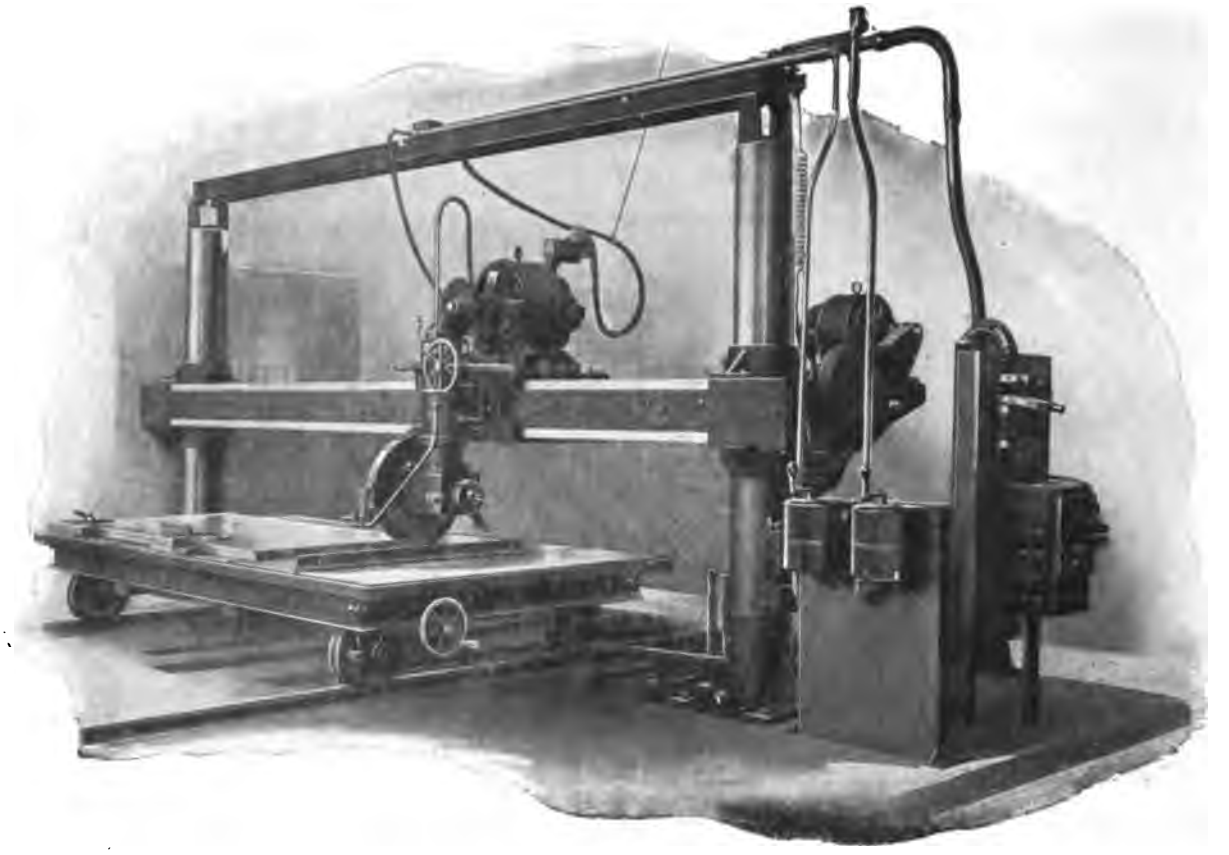

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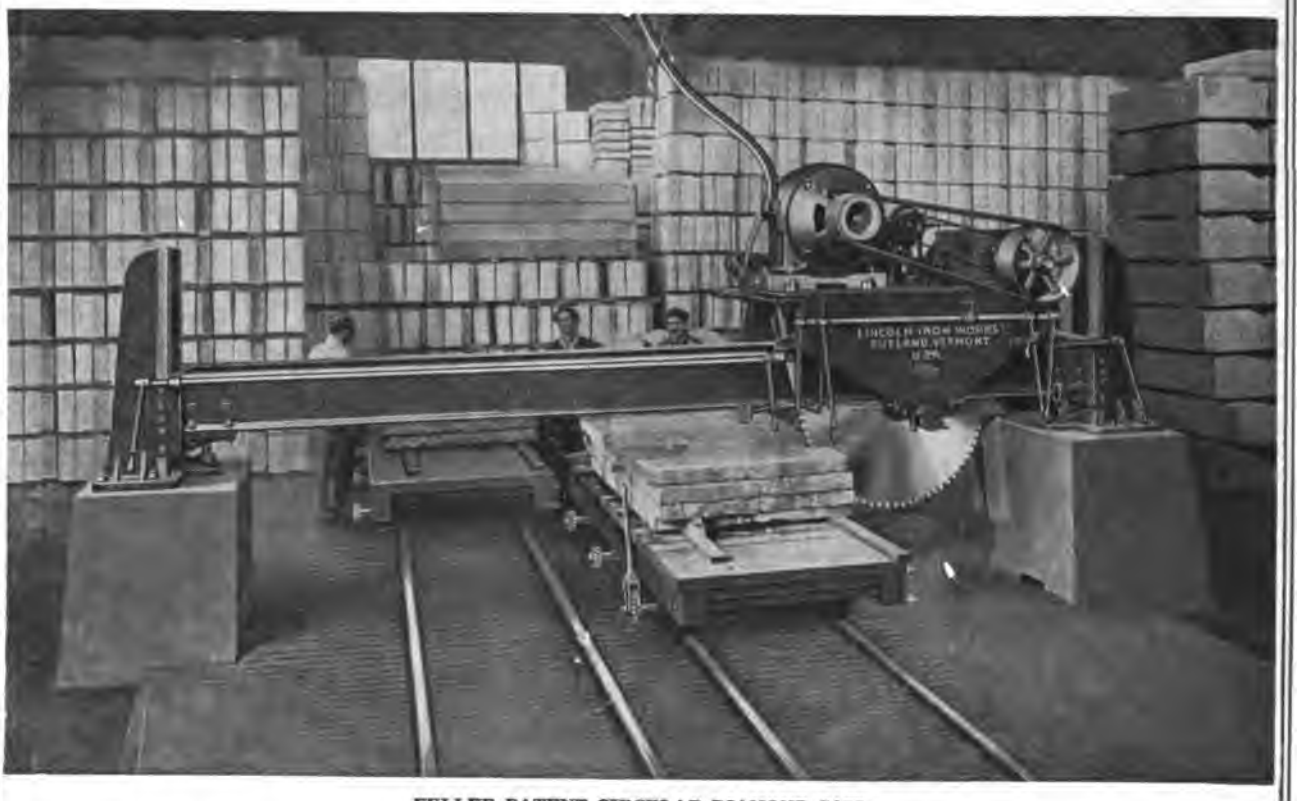

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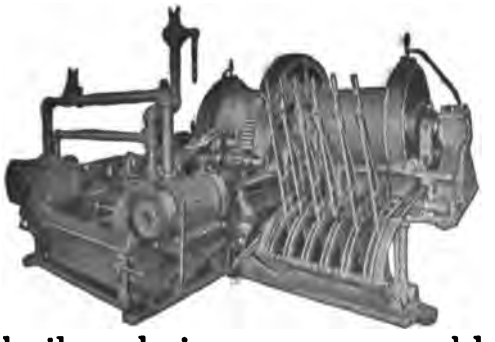

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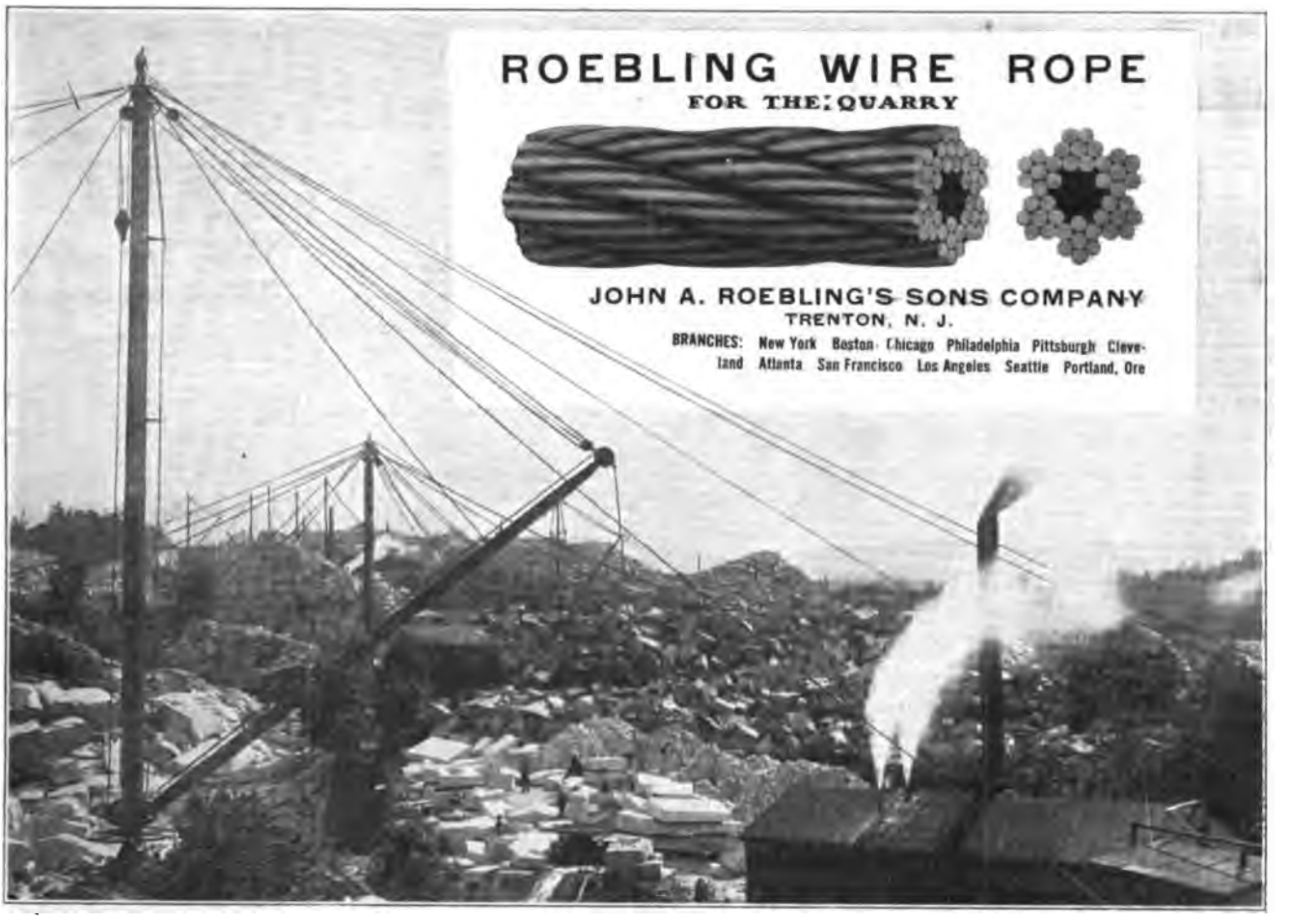
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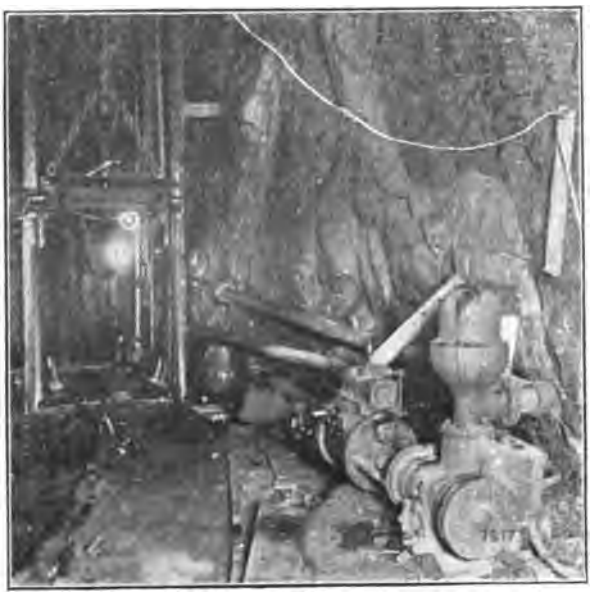

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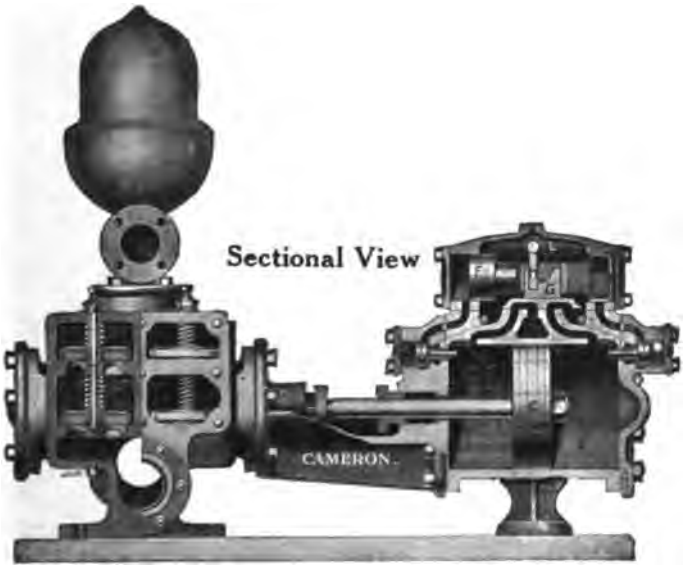

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VOLUME XXXIX APRIL, 1918 No. 4

CONTENTS

	PAGE
CUTTING STONE BY MACHINERY	169
ALTERATIONS TO A GREAT PALACE	170
GREAT BLAST IN NEW JERSEY	170
ARTIFICIAL STONE IN A MONUMENTAL BUILDING, *illustrated*	171
MARBLE WORK IN SANTA SOFIA	172
ALABAMA'S OOLITIC LIMESTONE	172
GOVERNMENT'S ATTITUDE TOWARD BUILDING	173
TALC AND SOAPSTONE	173
STONES SUITABLE FOR CRUSHING	174
QUARRY PRODUCTS IN GREAT BRITAIN	176
BUILDING AND WAR-TIME ECONOMY	176
QUARRYING OF ROCK GYPSUM	178
AMERICAN TROOPS QUARTERED IN QUARRIES	179
DOMESTIC LITHOGRAPHIC STONE IN 1917	180
SURVEY OF BUILDING CONDITIONS	180
DEFECTS OF TERRA COTTA, *illustrated*	180
EDITORIALS	182
BUILDING STONE IN JERUSALEM	183
CUT STONE CONTRACTORS ORGANIZE	183
SHIPMENTS OF FOREIGN MARBLE	183
BUILDING COSTS 200 YEARS AGO	184
REBUILDING FRANCE AFTER THE WAR	184
RAKING MOLDINGS ON EXTERNAL ANGLES, *illustrated*	185
NOTES FROM THE STONE FIELDS	186
CONSTRUCTION NOTES	187

ILLUSTRATIONS:

Museum of the American Indian, New York.
Quarrying a Big Block of Marble.

ALPHABETICAL LIST OF ADVERTISERS

	PAGE
Appalachian Marble Co	154
Ardolino Brothers	194
Bacon, Earl C	192
Barr, Thaw & Fraser Co	194
Bedford Steam Stone Works	194
Blum & Delbridge	194
Books for the Trade	156
Bowman & King Stone Co	194
Bowling Green White Stone Co.	166
Brodix & Malone	164
Brown, George & Co	160
Buckeye Gray Sandstone	165
Cameron, A. S., Steam Pump Wks.	199
Carr & Ball	194
Carthage Marble & White Lime Co.	194
Chicago & Bloomington Stone Co.	194
Circulation, Management, Etc.	196
Clark-Conroy & Co	194
Cleveland Stone Co	167
Consolidated Stone Co., The	163
Continental Car Co. of America	191
Craig Co., John J	154
Dallett Co., Thos. H	197
Dark Hollow Gray Limestone	163
Empire Engineering Co., Inc.	200
Empire Stone Co	194
Farrell Foundry & Machine Co.	192
Falt & Co., J. P	164
Flory Mfg. Co., S	192
Frenier & Son	192
Furst-Kerber Cut Stone Co	162
Georgia Marble Co., The	155
Gray "Canyon" Sandstone	167
Gray Eagle Marble Co	154
Gillies & Sons, James	194
Hanlein & Son, Henry	164
Harrison Supply Co	193
Heinlein Cut Stone Co., John	194
Hoosier Cut Stone Co	160
Indiana Limestone Quarrymen's Ass'n	158-159
Indiana Quarries Co.,	Inside back cover
Ingersoll-Rand Co.	193
Laidlaw Dunn Gordon Plant	197
Lidgerwood Manufacturing Co.	191
Lincoln Iron Works	190
Manning, Maxwell & Moore, Inc.	192
Marble & Marble Workers	154
Marine, Arlando	194
McDermott Stone Co	166
McLaren & Sons, James	164
McMillan & Son, W	161
Mt. Nebo Marble Co	160
Meyers Machine Co., Inc., Willard F.	195
Middlebury Marble Co	156
Miller Co., David	194
Monahan Stone Company	194
Morrison, D. G	194
Napoleon Gray Marble Co	168
Nash's Expeditious Measurer	192
New Albany Machine Mfg. Co.	192
Ohio Quarries Co	165
Patch, F. R. Mfg. Co.,	Inside back cover
Phenix Marble Co	168
Pollard Mfg. Co., Ltd	189
Quincy Column Turning Co	166
Rockport Granite Co	166
Roebling's Sons, John A	197
Ross & Republic Marble Co	154
Royal Marble Co	154
Shaw Electric Crane Co	192
Shea & Donnelly Company	162
Slate Industry of the World	160
South Dover Marble Co.	Back cover
Spurr & Son, J. J	161
Star Stone Co	164
Steam Stone Cutter Co	190
Struble Cut Stone Co., Henry	194
Sullivan Machinery Co	191
Sutermeister Stone Co., A	194
Sylvan Green Marble Co	160
Tompkins-Kiel Marble Co	157
Trow & Holden	196
Victoria Marble Co	154
Wolf Safety Lamp Co. of America	196
Worthington Pump & Mach'y Co.	197

BUYERS' DIRECTORY OF THE STONE TRADES, PAGE 198

CLASSIFIED ADVERTISEMENTS, PAGE 200

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STONE

VOLUME XXXIX MAY, 1918 No. 5

Getting Ready for Peace

IF the old proverb is true, "In time of peace prepare for war," the corollary naturally follows, "In time of war prepare for peace." At this time all lines of business are greatly affected, the stone trade in particular, because building activity has been interrupted and there is a general embargo on the transportation of all materials not directly needed in the conduct of war. This condition will not long be maintained. Business, as a rule, is prosperous in this country, and as soon as peace is declared it is certain that there will be a period of greater building activity than this country has ever known before. The only thing to do, therefore, is to conduct the stone industry in such a way that it will be prepared to take advantage of the demand that will arise with the conclusion of peace. If shipments cannot be made now, the thing to do is to put the quarries in such order that stone can be sent out without delay as soon as cars and transportation are available. Equipment should be in perfect order and all necessary beds of stone should be stripped and uncovered and ready for quarrying operations. There is plenty of opportunity now for overhauling apparatus in the entire plant and seeing that it is fit for its fullest capacity.

A very excellent campaign has been started in Wilkes-Barre, Pa., by architects, contractors and business men, who have formed the National Planning Bureau. This organization is urging business interests everywhere to prepare for the coming of peace by planning now the commercial buildings and housing accommodations that will be needed when conditions return to the normal. In its publicity work the bureau says: "There are no building plans—that is to say, no *drawings*—for future buildings, or very few. We have planned ahead our various departments of business, but have we not overlooked the work of the architect and other technical men as fundamentally essential factors in future buildings? We will have materials ready for the job—for lots of jobs—but have we not forgotten the *plans?* The planning and designing of buildings is as necessary to the demand for material as our hands and feet are to a healthy appetite. With an abundance of building material, labor, railroad facilities, good weather, a country booming with prosperity—a tremendous national and foreign demand—what are we going to do without plans? We shall be like a great army of hungry men, in the presence of food-a-plenty, bound hand and foot, and calling for help to a little group who shall be overwhelmed in their efforts to serve."

The bureau thinks this matter should be kept constantly before the business interests. It says: "Put it in your own words—emphasize the danger of delay. Tell the busy man that 'when he is going to build' is a matter of secondary importance. *What* he is going to build is the paramount issue—NOW! Show him that it takes time, care, thought, experience and skilled men, experts in the structural, mechanical, electrical and sanitary branches, decorators, routing engineers, men versed in modern business methods and equipment, transmission of power, and last, but not least, architectural design. Haste, through unpreparedness, means costly errors—things forgotten, or the 'cart before the horse,' commercial or architectural monstrosities, and monuments to incompetency and unpreparedness. We were unprepared for WAR, *let us be prepared for* PEACE."

An excellent attitude for the stone trade to take is indicated by the Indiana Limestone Quarrymen's Association. In a circular letter it calls attention to the fact that unquestionably the Federal Government will modify its emphatic opposition to all building construction not directly connected with war purposes. While this would not mean a general opening up all along the line, it should involve a considerably increased volume of activities. Then these suggestions are made:

"The conditions under which the Federal Government is likely to modify its embargo on building operations will probably be contingent on the employment of materials available locally. That is, construction at, for example, Pittsburgh, Pa., would meet with no opposition by the authorities if no great amount of transportation is involved. Transportation is the chief factor in the situation now militating against the oppor-

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tunities of Indiana limestone in its country-wide markets.

"Our thought on the subject is that the operator members should weigh carefully the desirability of a policy seeking to place stocks of blocks or standard size sawed stone wherever conditions make it practical and feasible to do so. It is not our province to offer definite suggestions, since just how such a thing would have to be done necessarily lies within the judgment of the individual. We do want to venture the statement, however, that stocks of blocks and standard size sawed stone may well be placed particularly in those communities where present and prospective general activities are at high tide, where war contracts of every description are resulting in greatly increased population and business. We should say that in cases it would prove profitable to place stocks of the kind mentioned, even though some consignment arrangement would be involved.

"It is our thought that in moving material as suggested hereinbefore, it be done on the basis of orders or instructions taken conditional on ability to ship. Shipper then to hold such orders open ready for immediate forwarding the moment cancelled embargoes and availability of cars permit. The embargo and car situation should improve steadily henceforward."

The Quarrying of Marble

The average newspaper account of methods of quarrying and working stone is generally more noted for imaginative touches than for accuracy. A recent writer in a Troy journal, however, seems to have a pretty clear idea of the process. He says:

Be it simply for the quarrying of trap rock, or for the extraction of the finer grades of building stone from the sides of the quarry pit, there you will usually find explosives regarded as a necessity for lossening the stone and getting it in portable form for cutting and polishing in the quarry sheds. It is a surprising fact, however, that in one of the largest quarries in the world where only the highest grade of marble is obtained the stone is taken from the earth, transported about the vast quarry of 25,000 acres, cut up, polished and put into shipping cases all by electricity. Never a single "shot" is fired. Never a stick of dynamite is used in the course of the average day's work.

This "quiet blasting," if such it might be called, is extremely simple. It consists simply in cutting the marble up into blocks with electric-pneumatic channeling machines. These machines run on tracks and in operation cut deep grooves into the bed of marble. When the channeling machines are through the marble slab resembles a large cake of ice marked off for sawing. Then electric drills bore a line of holes along the mark of natural cleavage. All that remains to be done is for the workmen to drive a series of wedges into the holes. The wedges cause a rift to form in the stone and it splits off into blocks roughly the same size as the dimensions marked off by the channeler. An electric hoist next lifts the stone to a waiting flat car and it is whirled off to the finishing shed, where the marble block is cut up by an electrically-driven gang saw, and sent out to all parts of the country as finished building stone.

The quarry in which this system of getting out stone is used is situated near Proctor, Vt. Starting from a few small marble workings operated by steam the company has prospered until it now employs 4,000 men, and occupies a total area of 25,000 acres. Today steam has been discarded and in its stead there are 570 electric motors with a total aggregate horse power of 14,000. The smallest motor units are of only a few horse power, and from these they vary in size up to the most powerful motors with 250 horse power. All of the electric power used on the workings comes miles overland through a high tension transmission line. The power is generated by four hydro-electric generating stations, backed up by two steam generating plants usually held in reserve.

A New Government Building at Ottawa

The Canadian Department of Public Works have called for tenders for the erection of an office building for the Dominion Government to be erected at Ottawa on the corner of Queen and O'Connor Streets. The building will be 200 feet by 100 feet, nine stories and basement and have about 700 rooms. It is estimated that the cost will be $1,500,000. The footings and basement walls will be of concrete thoroughly waterproofed. The skeleton will be of structural steel wrapped with wire mesh and encased in concrete. The external walls will be of terra cotta and the outside masonry will be gray granite, tooled six teeth to the inch, up to and including the plinth. The balance of the masonry will be of a gray or buff brick with a lime or sandstone trim selected by the architects.

The floors to the corridors and stair landings will be of 1¼ inch terrazzo. The offices will be covered with battleship linoleum cemented to the floor and nailed to bevel strips set in the floor at the openings. The main entrance floors will be treated with Canadian quarried marble and have a wainscoting and dado of the same material.

Building in Italy

Building operations for the civilian population in Italy, says an exchange, have almost everywhere been suspended, owing to the high cost of building material (the manufactories of which are almost all closed down because of the fuel problem), the call to arms or to munition factories of labor hitherto therein employed, and the diminishing need of new buildings, which may be attributed to the absence of the male population and of foreigners.

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Indiana Oolitic Limestone in 1917

THE total value of Indiana oolitic limestone sold in 1917 was $3,384,110, a decrease of $96,415, or nearly 3 per cent, compared with 1915, according to figures compiled under the direction of G. F. Loughlin, United States Geological Survey, in co-operation with the Indiana Limestone Quarrymen's Association. This value, however, was greater than that for any preceding year except 1912.

Almost the entire value in 1917, as in previous years, was represented by building stone. The total quantity of building stone sold in 1917 was 6,570,645 cubic feet, valued at $3,261,107, a decrease compared with 1916 of 23 per cent in quantity and nearly 4 per cent in value, the average price increasing from 40 to 50 cents a cubic foot. Rough blocks and rough sawed stone amounted to 4,806,850 cubic feet, valued at $1,631,297 in 1917, a decrease of about 18 per cent in quantity but an increase of 19 per cent in value, the price per cubic foot rising from 23 to 34 cents. Dressed or manufactured stone amounting to 1,763,795 cubic feet, valued at $1,629,810, decreased 34 per cent in quantity and nearly 20 per cent in value, the price per cubic foot increasing from 75 to 92 cents.

The report is accompanied by a table that differs from that heretofore published in the volume "Mineral Resources of the United States" in that it includes rough sawed stone with rough blocks, the figures for 1916 being readjusted on this basis. The prices per cubic foot for 1916 are therefore distinctly higher in this revised table, that for rough stone increasing from 21 to 23 cents and that for dressed stone from 59 to 75 cents. As the rough sawing of soft stone is merely equivalent to the splitting of large blocks of granite into smaller blocks and is only the first of several steps necessary to convert rough into finished stone, this revision more truthfully represents the condition of the industry. The value of Indiana oolitic limestone used for building has represented large percentages of the total value of limestone for building in the United States in recent years: 69 per cent in 1913, 69 per cent in 1914, 72 per cent in 1915, and 74 per cent in 1916. The percentages of the value of this limestone included in the total value of all kinds of building stone in the United States was 15 per cent in 1914, 19 per cent in 1915, and 23 per cent in 1916. These increasing percentages and the decrease in sales reported for 1917 indicate greater decreases in the total value both of all limestones and of all other kinds of stone sold for building in the United States in 1917, as may be surmised from the curtailment in building for all except war purposes. An estimated decrease of 30 per cent or more in total quantity and of 8 to 10 per cent in value will probably not prove excessive.

The quarry companies almost unanimously reported that business conditions were much poorer in 1917 than in 1916, especially in the last half of the year. A few companies reported decreases of 30 to 50 per cent in sales; and one company failed to show a profit for the first time in 17 years. Selling prices were advanced from 5 to 26 per cent, but cost of operation advanced much more, wages advancing about 20 per cent, fuel as much as 100 per cent, and different supplies from 10 to 300 per cent. Increase in thickness of over-burden also seriously affected the cost of quarrying. Mill

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On Park Avenue, 52nd and 53rd Streets. Architects: McKim, Mead & White, New York. Cut Stone Contractors: Barr, Thaw & Fraser, Hoboken, N. J. Built of Buff Indiana Limestone from the Indiana Quarries Co., Bedford, Ind.

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operators who bought their rough stone reported similar decreases in sales and increase in costs of labor and supplies, including rough stone, but nearly all of them reported that their selling prices were no better than in 1916, and some even reported decreases. A few mills were closed awaiting revival of demand, and no new developments of consequence were reported.

The quantity and value of finished stone sold by mill operators in the Bedford-Bloomington district who buy their rough stock were reported for the first time for 1917, amounting to 1,471,101 cubic feet, valued at $1,788,405, or $1.22 a cubic foot. These figures include a small quantity of monumental stone reported by two companies. The total value of the combined quarry and milling industry in 1917 was $5,172,515 and was probably second only to the value of the combined granite quarrying and milling industry in the Barre district, Vermont, which in 1917 was $8,316,600.

Shipments by quarrying and milling companies to different States were made to 43 States and to Canada. The six States to which no shipments were reported were, with the exception of Vermont, in the far West, and none except Washington have a population much if any in excess of 500,000. The large shipments made by Indiana, the leading State, is due in part to duplication, stone that was sold by quarry companies to mill companies in the Bedford-Bloomington district being counted twice. Even after the total quantity shipped by milling companies is deducted, however, Indiana retains the lead by a large margin and is the only State making shipments whose total value exceeded $1,000,000. New York was second with $844,975, and Illinois a close third with $833,918. Pennsylvania was the only other State whose shipments exceeded $500,000 in value. States with values that exceeded $100,000 were, in order of rank, Ohio, Michigan, Wisconsin, Iowa, District of Columbia, Nebraska, and Missouri. Canada also exceeded this figure.

Crushed stone, mostly for road metal, came largely from the Mitchell limestone, which overlies the oolitic stone, and amounted in 1917 to 93,086 short tons, valued at $62,698, and fluxing stone amounted to 47,439 short tons, valued at $10,163. These, with smaller quantities of riprap and stone sold to sugar factories, glass factories, and for agricultural use, reached a total of 210,326 short tons, valued at $123,003, a decrease in quantity of 0.9 per cent but an increase in value of 41 per cent, the average price per ton rising from 41 to 58 cents.

Wages for Scotch Masons

At a recent meeting of the Dundee branch of the United Operative Masons' Association of Scotland there was a discussion of the agreement that had been concluded between the employers and the operatives' association engaged in the building trade in Scotland, as the result of a conference held in Glasgow in connection with the question of wages, writes Consul H. Albert Johnson, from Dundee. This meeting, after careful consideration of the question, adopted resolutions that, so far as wages are concerned, all previous agreements associated with the society shall be suspended for the period of the war, and, instead of an annual agreement as to wages, they shall be revised every four months. All negotiations on wage questions would be on a national basis and apply to all sections of the building trade.

The procedure would be to have a representative committee put forward a claim on behalf of the whole building trade before the commerce of production, and whatever increase was granted would apply to all alike. The agreement would also allow the society to raise the question of districts where the present pre-war rate was considered too low, or where in certain places the increase since the war began was considered too small.

A motion was approved under which the central committee of the association was vested with authority to act on its own initiative during the period of the war in negotiations pertaining to wages, and to offer suggestions as to the amount of increase to be put forward.

Building in Montreal

The first quarter of the year has not opened well for the Montreal building trade, judging by the civic permits, says a Canadian journal. Last month the total was $241,660, a decreas of $101,800, while the value for the three months was $434,815, a decrease of $561,105. More work, however, is coming out, but is not of much importance. While it looks as if there will be a little activity in the construction of schools and churches, at the moment the outlook for heavy construction is not satisfactory. Montreal contractors, so far, have not been entrusted with so many out-of-town contracts as was the case in the two previous years, but they are hoping that the government office at Ottawa will come their way. Some three or four bids from Montreal firms are in. Prices of building supplies are higher, due in some degree to increased transportation charges and wages. Building permits issued in Montreal in the month of March number 90, and are valued at $241,660, as compared with 105 permits, value $343,460, in March, 1917.

Building Picking Up in Vancouver

Building work in Vancouver, B. C., shows signs of picking up. Building Inspector McKenzie reports the issuing of 64 permits, valued at $79,170, during the month of March, as compared with 46, valued at $33,715, in the same month last year. For the first three months of the year the total is 153 permits, at a value of $181,480, wihle during the corresponding period in 1917 there were 119 permits issued, valued at $159,540.

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Indiana Limestone and the War

LAST month an account was given in these columns of a conference with government officials in Washington had by a committee representing the producers and manufacturers of Indiana limestone and various commercial interests of Bedford and Bloomington. The purpose was to impress upon the government the vital importance of a great industry that was menaced by the discouragement of building activity. On March 29, in the House of Representatives, Congressman Oscar E. Bland made an interesting speech on this subject. Mr. Bland said that the action of the government in refusing to let building contracts, and of the various banking institutions in discouraging loans and financial assistance for all building and other so-called "non-essential" projects, was working a great hardship to the district he represented. He gave figures to show the importance of the industry in Lawrence and Monroe counties, Indiana. Mr. Bland incorporated in his speech a table prepared by the Government Geological Department, showing the States and Territories into which the product of the quarries in this district has gone during the year 1917 and the value of such production. The total amount sold by the mills (who buy rough stone) was 1,408,036 cubic feet, valued at $1,751,758. The amount sold by the quarrymen (rough stone and stone milled by the quarrymen) was 6,757,609 cubic feet, valued at $3,324,992. Another table gave further particulars, showing that during the year 1917 there was a decrease in production but an increase in value over the year 1916. This condition was largely due to the increased cost of labor and machinery.

Then Congressman Bland said: "Picture, if you can, gentlemen, these forty-two mammoth mills and quarries, employing their thousands of men, dotting the beautiful hillsides of this great portion of the State so wonderfully blessed by nature! Picture the thousands of happy, contented homes, where, owing to steady employment at good wages, the head of the house was enabled to not only shelter, feed and clothe and educate his children, but to enjoy all the comforts and many of the luxuries of life, and incidentally to be able to buy Liberty Bonds and in a hundred ways contribute to the revenues of the Government that are required to finance this war. That was the condition in this prosperous community prior to the time that the production of stone, except in certain excepted lines, was declared as 'non-essential.' The business of these communities depended upon the pay rolls of the quarries and mills; the laborers built their homes in the building and loan, and I am glad to say that most of them own their own homes. A more thrifty, intelligent, industrious and patriotic class of men never lived than the stone quarrymen of this district. They met the first calls of this Government for war purposes heroically.

"Today 2,000 men, I am informed, have left this community, trying to find work, work no doubt that they are not suited for. Many of them have spent a lifetime in becoming efficient in this particular line of duty and it is difficult for them now to be torn away from their life-long pursuits and to become accustomed to new avocations of life. Probably not more than a thousand men are now employed in the stone business in this field. The quarries and mills are probably running 20 per cent. capacity. There are at least, I am informed, 2,000 idle men who refuse to leave their

CARVED MANTEL IN BUFF INDIANA LIMESTONE
Architect, Thomas Benjamin & Son; cut stone contractor, Fred H. Hirth, all of Grand Rapids, Mich.

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homes and families and go out into the world of uncertainty to start life anew. The loan associations must foreclose their mortgages, because they must pay the banks or the banks must fail; the merchant must discontinue credit to his customers who have always been able to pay. I am told that bread line and soup houses, if not there now, are only avoided by the splendid charity of public-spirited citizens.

"Some one in bitterness has said that it is apparently the intention of some men in charge of governmental affairs today to conscript capital by taxation and to conscript labor by starvation. I do not believe this statement; I do not think there is a man connected with this Government today who seriously entertains such views or would dare to even attempt to put them into practice. The high cost of living has been a terrible problem to the laboring man. I have studied his condition closely and I am one of those who rejoices today in the splendid patriotism and sacrifices of the toilers of the Nation. If you will give him a chance to make a living for himself and his family and 'keep the wolf from the door,' he will help you 'whip the Kaiser'; but frankly, I would fear the consequences if hunger was permitted to gnaw the vitals of the great laboring class who produce the wealth of this Nation.

"This stone in this district is for the most part quarried and milled by hydroelectric power. Very little fuel is required in this industry. The Government is now erecting a great many permanent buildings other than post office buildings. The manufacturers of imitation stone, terra cotta and brick have the ear of those in charge of Federal building operations. The terra cotta fellows seem to be the favorites. Terra cotta and imitation stone require the use of a great amount of fuel, since both products are baked in ovens. The Indiana limestone mills can produce building blocks or building bricks of uniform size quicker than any of those competitors can produce either of the other products. There can be no comparison in the durability of the material and but inconsequential difference in the price.

"The other day, in seeking relief for this distressed condition of the people of my district, I sought the help of Secretary McAdoo. He was patient and kind; he was, no doubt, astonished at the havoc the 'non-essential' propaganda was creating in this great industrial center. Mr. McAdoo expressed his deep regret for these conditions, re-expressed his faith in the soundness of the 'non-essential' principle, and at the same time expressed the hope that 'the poise of industry would be maintained'; and then he asked, 'What can I do to help them?' I replied that a modification of the declarations made was not only proper but absolutely essential. I do not contend that it is of first importance that jewelry shall be manufactured; that sporting goods be produced; that fancy luxuries be indulged in; or that building operations or credit essential to these luxury-making enterprises be encouraged; but I do take the position that hundreds of different building operations necessary and essential in peace times are likewise essential and important in time of war and that credit and money and labor so employed is not wasted, but, on the contrary, opens up an avenue for Federal taxation and strengthens the industrial life of the country, which I regard as essential to the winning of the war.

"Yesterday I called upon the director of housing, who will probably spend the money provided for in this bill. He is now building homes for employees at Trenton, N. J., and at Hog Island, Pa. He states that they are using brick, but that they will probably use limestone from this district for the door and window sills. Now, the manufacture of ordinary brick occasions the use of fuel in great quantities, while the quarrying and sawing of stone in this district is largely done by hydroelectric power.

"In the consideration of this problem it must be understood that a territory devoted to quarrying of limestone is not fitted for agriculture, and it is also true that, for the most part, the entire population of the cities of Bedford and Bloomington, which are the beautiful county seats of Lawrence and Monroe counties, respectively, and much of the surrounding community, is absolutely dependent upon the stone industry. An expert stonecutter or quarryman, as I am informed, is rarely fitted for any other pursuit. This makes the blow fall heavily upon this community. Brick terra cotta and artificial stone being manufactured products are not limited to any particular community. It certainly should be the aim of those in charge of building activities of the Government to use the product of this quarrying district where it is at all practicable and it is largely for the purpose of impressing this important fact upon the minds of you gentlemen and others to whom this information may go that I have spoken so much at length at this time.

"In addition to my efforts in the direction spoken of, I have walked many miles through the labyrinth of corridors and oak-desked war offices in the multitude of war-activity buildings in this District trying to induce the various War Department heads to locate some kind of war activity in this stricken district or to let a contract for the making of some kind of war materials to some of the enterprising people of this community, but I have discovered that most of the war activities have gone South and the war contracts have gone South or East.

"In desperation the owners of these large, idle mills, some of them nearly a thousand feet long and a hundred feet wide, equipped with derricks and cranes for moving heavy materials, have appealed to the Quartermaster General's Department and other departments for the privilege of leasing these mammoth sheds to the Government for storage purposes. I am not even hopeful that this will be done, and, in my opinion, whatever relief is to come to these people must come in

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the way of using Indiana limestone for Government building purposes and in the broadening of the policy of the Government with reference to a modification of its present attitude on 'non-essential' industries.

"I am conscious of the fact that the 'non-essential' propaganda effort, if it may be so styled, has not only affected the Indiana limestone district but has paralyzed the building trades of the whole Nation. I do not have at hand the figures as to the number of men out of employment in the United States at this time, when labor is reputed as being so scarce and so valuable and high priced, but I have heard an estimate of the number so unemployed and it is truly appalling.

"We are told that from actual experience abroad it has been ascertained that it requires seven persons in industry to support one soldier at the front. In the case we have a United States military establishment of 3,000,000 men it would mean 21,000,000 men mobilized in our industrial army. What do you intend to do with those who are so unfortunate as not to be able to participate in war activities? Will it not eventually pauperize and bankrupt the Nation? Should it be our aim to run this war on money already earned, or should we have as a source of revenue supply a great, active industrial army of prosperous, busy people? England and Germany have not paralyzed their industries, but are permitting them to run at full blast with labor not required for war service, and then they tax these industries to the very limit, having regard only for the continued life and tax-paying ability of these institutions."

Blasting Stone by Electricity

At many large operations where considerable blasting is carried on to break down the material, it will be found that most of the blasting is done by means of electricity. In order to eliminate the human element as far as possible, the larger operations have adopted the use of "power circuits." This may consist of either direct or alternating current, although it is generally considered that for blasting purposes the former is the better. The wires are strung on poles around the quarry in such manner as to be easily accessible from the point where the blast is to be made. On various poles wires are run down from the main power line to a small box attached permanently to the pole. From these points the blasts are made. Two up-to-date and satisfactory methods used are as follows:

At the quarry of the Solvay Process Company, Sibley, Mich., a switchboard is used. This consists of a board to which is attached two wires with a plug, two 100-ampere fuse plugs, two binding posts to which the lead wires from the blast are attached, and a knife switch.

In making connections of the electric blasting cap wires to the lead wires, care is taken to see that the lead wires do not at any point come in contact with the ground so that there will be no chance of electric leakage at the connections. The electric blasting caps are connected to the lead wires either in parallel or parallel series, which is splendid practice where power circuit is used. After each electric blasting cap is loaded in the bore hole and again when all are connected to the lead wire, they are tested by the Du Pont Galvanometer to determine that everything is all right electrically. When all is ready, the lead wires are connected to the binding posts, the plug is inserted in the socket in the "shooting box," and then the blast is made by closing the switch. After the blast the plug is removed and the lead wires are disconnected. This makes a cheap but very efficient arrangement of making blasts and is one that is along the "Safety First" idea.

Another good method is one that is followed by the Michigan Limestone & Chemical Co., Rogers City, Mich. At this quarry they use a box, instead of a board, in which the switch is enclosed. This box is always closed and locked, when not in use, key being carried by the blaster.

Slab of Marble Delays a King's Funeral

Because a slab of marble needed to complete the mausoleum of the late King Alexander Adams, ruler of the gypsies of the country, failed to arrive in Oakland on schedule, approximately 1,500 nomads gathered from all parts of the country to vote on a successor, silently stole away again. They will be recalled when the slab arrives.

The normal population of the gypsies in California is estimated at 300 persons. The other 1,200 came from all parts of the Pacific coast, the Eastern and Middle Western States. Many of them came in gaudy covered vehicles drawn by horses, true pictures of the fortune telling gypsies on the roadside. A large proportion of them arrived in motor cars, many of these being of the latest model.

The election of a king was postponed. The gypsies learned the tomb of King Alexander could not be completed until a single missing slab of marble arrived from Italy. Until the tomb is finished the old king may not be buried, and until he is buried Romany must do without another king.

A Natural Safety Valve

A round, smooth hole in the side of a granite mountain about nine miles out from Mexico City is locally known by a term which signifies "Pluto's safety valve." The hole is about nine inches in diameter at the opening, which is polished in a manner which suggests human workmanship. That man had nothing to do with drilling or polishing this hole will be readily surmised when it is known that it has occasionally emitted hot air and smoke during a period extending 300 years.

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The Air Hammer and Health

FOR some time past the labor unions have been conducting a campaign against the use of the air hammer for stone cutting, particularly in the Indiana limestone belt. The men have claimed that the use of this tool has a bad and permanent effect upon the health of the operator, bringing functional disorders, nervous breakdowns and various other evils in its train. The employers, on the other hand, declared that there were no well authenticated instances of serious effects of the air hammer on the health, and pointed to the use of pneumatic riveters and chisels for many years in the metal and other trades without complaint from the men. The matter is one of great importance to the entire stone trade, but nothing is to be gained by a loose discussion between the advocates and opponents of the tool. What has been needed is a scientific investigation of the subject, and this is now furnished in a report by the United States Public Health Service, under date of March 22, 1918. A thorough examination of the effect of the tool on the workers in the Indiana limestone field was made by J. P. Lake, Passed Assistant Surgeon, and Dr. David L. Edsall, Consultant in Industrial Hygiene, both of the United States Public Health Service. Their findings are given in full in Volume 33, Number 12, of the Public Health Reports, issued by the Government Printing Office. This is very technical and is too full of medical terms to be quoted with any completeness in these columns, but their general conclusions are of interest and importance.

As to the manner in which the investigation was conducted, Dr. Edsall says:

"We requested Mr. Griggs, president of the Journeymen Stonecutters' Association of North America, the local officers of the stonecutters' association, and many of the men in both Bedford and Bloomington to bring to us those who complained most, or we got their addresses and went to their homes. None of the men that we examined were sent to us through the employers, and none were examined in the presence of the employers or their representatives. In Bedford we reached them chiefly in their homes. This had the advantage of making them and their households feel quite free to talk in regard to their condition. In Bloomington, Mr. Walters, the secretary of the local branch of the stonecutters' association, brought the men to us. In both places the men seemed extremely frank and open in what they said. They are, as a class, superior men in personality, education, and manner of living. It rapidly became apparent that because of the symptoms that I shall describe occur frequently, and fear had been aroused in various ways that they might grow worse, the anxiety of the men was due more to this fear of further and more serious results than to anything known to have occurred. In fact, several of those with the most pronounced manifestations said that if that was all, they thought it of comparatively slight consequence. Their fears of bad results had apparently been largely aroused within two years by their interpretation of the opinion of some physicians who had seen some affected men, but who, so far as we could learn, had not actually studied the cases or the men's work carefully, but had somewhat naturally based their advice upon the men's own apprehensions."

A very careful examination was made of nineteen men and Dr. Edsall says that the principal cause of complaint was a temporary blanching and numbness of the fingers when chilled. It occurs almost entirely when the weather is cold, and chiefly in the morning when the men start work and before they get "warmed up." It also tends to recur in cold weather when they are not working or when they plunge their hands in cold water. The condition was described by the men as "annoying," rather than serious. The numbness does not interfere appreciably with the use of their hands. Occasionally they state that it makes them clumsy, slower and less accurate in their work while it lasts.

The men sometimes complain of lameness in the arms, shoulders, or chest, says Dr. Edsall. Two said they slept badly and twitched and turned in their sleep after working hard with the hammer. These two, however, were in poor general condition. Various other symptoms of vague character and significance were elicited in some of the men. I may, however, for brevity's sake state here that neither questioning the men nor careful physical examination showed evidence that the symptoms mentioned or any others outside those in the hands were of any particular significance. They were rather such symptoms as some members of any group of men will always show when doing work, of whatever kind, that is at times hard work and often carried out in constrained positions.

Some excitement had been caused by the fact that one stonecutter had died insane. This case the men themselves now dismiss, however, as having been due to general paresis. One man we saw had had an ordinary acute facial paralysis. Quite naturally, in the apprehension that had been aroused, such occurrences and various vague rumors and suggestions had led to fears of "paralysis," Raynaud's disease, and a variety of other grave results. We could find absolutely nothing to justify such fears, even in the stories we were told. It is entirely conceivable that a neurotic subject might grow decidedly neurasthenic from dwelling on

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the disagreeable sensation that these small pneumatic hammers produce. Some of the men said that the sensation was exceedingly disagreeable to them at first, but all except the nervously over-sensitive soon get so accustomed to it that they pay no attention to it. It is in this respect like many other accompaniments of industry, as for instance the noise in many forms of work.

No muscular atrophy was observable. Five men stated that they had earlier had the trouble decidedly, but that it had gradually lessened until it had almost entirely disappeared. They attribute this to having learned to use the tool with greater skill and especially with an easier and less cramped grip. Other experienced workmen told me the older and more skillful men have less bother than the younger and less skilled and attributed this to the same cause and to the fact that the young men use the mallet little in "roughing out," while the older have more familiarity with the mallet and use it a good deal. Mr. Griggs stated also that it is more common in the young men than in the older. He believed this due to the more common use recently of the larger hammer, but the older men state that they use the larger hammers as much as do the younger.

Dr. Edsall says that there are three chief factors that evidently may play a part in producing the symptoms: Cold, constriction, and vibration. He is inclined to believe that the cold elicits the symptoms, rather than produces them. He makes these recommendations:

"It is obvious that certain simple things may be done to attempt to eliminate the trouble. First of all, the shank of the tool, where it is held, could be made larger, so that the grip need not be so strained. In doing this it would be well to use some substance that would conduct cold or heat poorly, instead of, as at present, intensifying the effect of cold by holding the cold metal. Asbestos suggests itself, and its practicability could be tried. Some of the men have tried rubber hose drawn over the tool, but said it tended to work upward on the tool and choke the action of the hammer. One man, however, said that he soaked the hose in oil, drew it on his tools, and allowed the softened rubber to adhere to the tool in drying and thereby was able to use it successfully. He said that he had earlier had 'dead fingers' but is no longer troubled by them. Asbestos, if practical, would have evident advantages. Some such handle would perhaps serve also to some extent as a shock absorber and thus reduce the possible effects of vibration. It is possible, too, that practicable methods of keeping the tools warm in cold weather could be easily devised and would reduce the discomfort. It is also to be noted that the practice of controlling the exhaust with the thumb or fingers of the right hand should be discontinued. In the same connection it is to be observed that in some hammers, due either to their construction or to wear, the exhaust leaks out downward along the tool—which it should not do—giving a slight constant blast of cold air on the left hand. This should be obviated. Heating the compressed air has, I believe, been tried, but meets with difficulties, and I do not believe it would be of much value if successfully done.

"Reducing the time spent at any disadvantageous work and shifting to other forms of work is in many kinds of industrial disorders sufficient largely to overcome the trouble. In this instance there is an obvious way of accomplishing this—by requiring the men to use the mallet in suitable parts of the work, especially in 'roughing out.' The operators say they have always preferred that this should be done, especially because compressed air is expensive, but that the men will not do it. The men admit they use the hammer in such work when they do not need to, partly because

A Simple But Dignified Indiana Limestone Mantel
Architect Thomas Benjamin & Son, Grand Rapids. Cut in Buff Indiana Limestone by Fred H. Hirth, Grand Rapids

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they get more done, but they say that unless they do the foremen look unfavorably upon them and are likely to drop them because they do not work so fast. Evident adjustments and understandings are needed on both sides here. Both the men and the operators and their foremen should recognize that the frequent shift to the mallet may go far to obviate the trouble."

Dr. Leake's conclusions agree thoroughly with those of Dr. Edsall, and his suggestions for remedying the trouble are along the same line. Dr. Leake also made an investigation of the pulmonary hazard among the stonecutters in the district. He says: "It appears that while Bedford has a proportional death percentage from phthisis slightly above normal, it has been no higher for stoneworkers than for other classes of the population, including females." The entire report should be read by all who are interested in the subject.

Repairing St. Paul's Cathedral

During the past few years much has been written of the settlement of London's most famous church, St. Paul's. Fears have been expressed that the foundations had been so weakened by the construction of the underground railway in the vicinity that the entire structure might collapse. Mr. Charles E. Sayer, in the course of an article in an English paper, states that happily it now seems clear that the foundations are not in fault, and that the root of the trouble is in the fabric itself. All new buildings settle more or less, according to their weight and the manner of their building, and St. Paul's, with its central dome weighing nearly 40,000 tons, has settled unevenly. The trouble is no new thing; serious defects showed themselves even in Wren's time, and he carried out extensive repairs in the crypt and elsewhere in 1710. In 1751 Flytcroft, surveyor to the fabric, reported, attributing the settlements to the rubble core of the piers and walls, and this, the earliest extant report, has been confirmed by recent discoveries. Things grew worse, and pieces of stone fell from time to time into the church, and in 1781 Mylne, then surveyor, was entrusted with the repairs, and the building was closed for eighteen months. Unfortunately, Mylne proceeded to conceal rather than to make good the defects.

The facing is of Portland stone, with joints about ¼ inch thick, and behind is the core of small rubble of Kentish rag, chalk, and five or six other kinds of stone, probably taken from the ruins of the old Cathedral, set with very thick joints of rather inferior mortar. It is evident that when the weight of nearly 5,000 tons on each pier was applied the mortar, being the softest part of the structure, would be compressed, and the core with four or five thick joints to one thin one of the facing would settle most, thus throwing an enormous strain on the Portland stone. This splendid stone stood the strain on the whole in a marvelous manner, but many stones were crushed and shivered, and the loud reports and falling pieces which would result must have been alarming. These facts are quite enough to account for the subsidences which have taken place, and there seems to be no evidence of any failure of the foundations. Under these circumstances the architect to the Dean and Chapter advised a thorough repair, beginning with the worst pier—that of the west side of the south transept arch.

As an instance of the thoroughness with which the problem has been treated it may be mentioned that at every critical point where any fresh movement in the building would be likely to show scientifically constructed gun-metal tell-tales, capable of being gauged and leveled to one-thousandth part of an inch, have been fixed. These are most carefully tested every week, and it is satisfactory to know that no measureable movement has been registered anywhere during the three years they have been in use. The question of further repairs is now under consideration, and it is earnestly to be hoped that money will be forthcoming to enable the Dean and Chapter to go forward with the work.

Limestone for Nitrate Plants

The rock crushing plant of the Foster Creighton Company at Rockwood, four miles south of Russellville, Ala., is the scene of much activity. The company has contracts with the government to furnish crushed rock at the nitrate plants in Sheffield and Florence until 1923, and the government has practically taken charge of the plant at Rockwood; $200,000 worth of new machinery has just arrived at the plant, and a swarm of men are now engaged in placing the machinery and building new houses for extra labor. When the plant is in full operation again it will be one of the largest of its kind in the south. The supply of rock is unlimited. The weekly pay roll of the plant, when production begins to full capacity, is expected to be in the neighborhood of $40,000.

A Peculiar Stone Found in the South

Staurolite is a curious mineral, or stone, found only in Virginia and North Carolina not very valuable but interesting on account of a legend that attaches to it. The name is from the Greek stauvos, a cross, the stone is found in the form of a cross, or sometimes a double cross. Another name for the stone is the "fairy stone," and this also relates to the legend that the fairies living in the caves of the mounains, on hearing the sad tidings of the death of Christ fashioned these crosses as mementoes of him. There has always been some commercial demand for the stones as curios and they are worn as watch charms or on chains with lockets.

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Making of Clay Products Restricted

MORE than once this magazine has called attention to the fact that the United States Government, since we have entered into the great war, has discouraged the class of building work in which natural stone would be the obvious material of construction. The reasons given for this course are to conserve our resources in the way of structural steel, fuel and transportation for our needs in carrying on the war. At the same time, in such building work as the government has undertaken it has made free use of brick, terra cotta and imitation stone. The logical answer to any such procedure, as we have already pointed out, is that the employment of natural stone would tend to the conservation of these resources far more than the use of the substitutes. Our quarries are well equipped, and need nothing in the way of additions to plant, whereas the manufactured articles require elaborate and extensive factories, kilns and mills, calling for constant repairs and replacements. There are also large stocks of stone on hand at the quarries which could be drawn upon without the necessity for much added labor. Many of the quarries, particularly in the Indiana limestone district, are operated by hydro-electric power and so use little coal, while brick, terra cotta and cement consume large quantities of fuel in the making. Stone is transported on flat cars and most artificial products in box cars, the latter being in great demand for the carrying of food and munitions of war. In buildings of ordinary size stone masonry can be erected without a structural framework, but terra cotta and artificial stone need steel and iron reinforcement.

It would seem as if this point of view had finally dawned upon the Government, for on April 17 the United States Fuel Administration issued regulations, approved by the War Industries Board, restricting the manufacture of clay products and rearranging and dividing the manufacturing programs of this industry in such a way as to place it on the basis of war industry. The products are arranged in ten classes, and the restrictions are as follows: On face brick, common brick, paving brick, terra cotta, roofing tile, floor and wall tile, and sanitary ware, 50 per cent.; hollow tile and drain tile and sewer pipe, 25 per cent., and stoneware (except chemical) 15 per cent.

The circular sent out by the Fuel Administration says: "Curtailment in each case is based on the average output of the past three years. It will be noted that the percentage of curtailment is not equal in all classes of clay products. These figures have been reached after careful investigation and represent rates of production which will be for the best interests of the necessary Government work and in general for the interests of the manufacturers involved.

"The experience of the last year has brought two facts clearly to the front: First, that as far as possible the new war work must be put into old factories to take the place of less essential production. This method of producing war supplies prevents building problems, housing problems, and transportation problems which necessarily follow the setting up of new plants for war production; second, that in addition to this transference it will be necessary for many industries to make deliberate sacrifices of a part of their ordinary business in order that there may be transportation, men, and materials enough for war production.

"The War Industries Board and the Fuel Administration have been for several months obtaining information which would enable them to reorganize lesser essential industries, such as building materials, which tax transportation facilities and fuel supplies to the largest extent. The Bureau of Standard and experts associated with each industry have placed their services at the disposal of the Government and have aided in reaching conclusions.

"In general the minimum basis of running for the year has been established in each class of clay products. This minimum has taken account of the more necessary requirements outside of strictly war activities as well as the necessities of the Government. Beyond this, it is arranged that whenever the Government departments certify requirements in any of the divisions exceeding the productive capacity of a given district on the minimum basis, such facts will be certified to the Fuel Administration and permits for additional running will be issued.

"The aim has been to conserve the larger interests of the trade involved. Equal treatment for all plants is provided wherever possible. Allowance, however, is made in the plan for recognizing individual instances where an abundance of fuel and absence of congestion make it desirable that a large proportion of production be permitted in a given district. The granting of such additional output has been hedged about with safeguards so that general conditions in the different trades will not be seriously affected."

The regulations of Fuel Administrator H. A. Garfield in regard to common building brick is as follows:

The term "common building brick" in this regulation shall be construed to cover all common building brick made by any process whatsoever. The term "manufacturer" in this regulation shall be construed to cover any person, firm, association or corporation engaged in the manufacture of common building brick.

No manufacturer, as defined above, shall, at any of his plants, consume, burn or use fuel of any description, including coal, coke, fuel oil, natural gas or other petroleum products, or use power derived from any such fuel, for or in connection with the manufacture of common building brick, as above defined, during the

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year beginning January 1, 1918, and ending December 31, 1918, to an amount in excess of fifty per cent. (50 per cent.) of the average annual amount of fuel consumed at such plant for or in connection with the manufacture of common building brick during the period from January 1, 1915, to December 31, 1917, excepting—

First: In case such plant was not in existence on January 1, 1915, then, and in such case, the period during which it has been in existence prior to January 1, 1918, shall be used as a basis in arriving at a determination as to the quantity that would constitute one-half of the average annual production.

(*a*) Upon evidence that the necessities of the Government in the particular district in which such manufacturer is located can not be supplied by plants within practical shipping distance of the place where the United States Government requires such product, unless permission is granted for such excess production, and that on this account it is necessary in the interest of the United States Government that such permit be issued.

(*b*) Upon receipt of certification from the Fuel Administrator of the State in which the plant is located that the material to be manufactured is to be used in connection with building operations of urgent public necessity and that the fuel used in manufacturing such material can be spared for such purpose.

Second: That whenever two or more manufacturers of common building brick shall find that a further fuel economy would result from combining the output of two or more plants, then and in such cases it shall be permissible, after receiving written permission from the Fuel Administration, for the several manufacturers to combine the aggregate allotment of fuel to the several plants, to be used jointly for the purposes of production, the manufactured products of such combined plants being distributed to the individual manufacturers as may be agreed between them.

In plants which manufactured common building brick exclusively during the years 1915, 1916 and 1917 manufacturers shall not consume, burn or use fuel to manufacture clay products other than common building brick without first presenting evidence that the manufacture of such other clay products is in the interest of the United States Government and receiving from the United States Fuel Administration permission in writing to manufacture such products.

It is ordered that on or before June 30, 1918, each manufacturer of common building brick shall report to the United States Fuel Administration the number of common building brick manufactured and the amount and kind of fuel consumed during the period from January 1, 1917, to December 31, 1917, and the amount of stock on hand December 31, 1917, and that thereafter semi-annual reports showing the number of common building brick produced, the amount and kind of fuel used, and the stock of brick on hand shall be made for the period from January 1, 1918, to June 30, 1918, and from July 1, 1918, to December 31, 1918. The report for the first period shall be made not later than August 1, 1918, and for the second period not later than February 1, 1919.

Any such manufacturer violating or refusing to conform to the above regulation will be liable to the penalty prescribed in the act of Congress. (Fine of not more than $5,000 or by imprisonment for not more than two years, or both.)

The term "terra cotta" is construed to cover all architectural terra cotta, whether glazed or unglazed, intended to be used for the interior or exterior construction or decoration of buildings, made by any process whatsoever.

Carthage Limestone and Marble

Missouri, which ranks second to Indiana in the production of limestone for building and which showed gains of 17 and 25 per cent, respectively, in value of output in 1915 and 1916, suffered a decrease in 1917, according to figures compiled under direction of G. F. Loughlin, United States Geological Survey, Department of the Interior. This decrease was due to decline in sales in the Carthage district, Jasper County, which has furnished 65 to 75 per cent of the limestone for building sold in the State in recent years. The decrease, which was caused by curtailment of building operations due to the war, began in the spring of the year and has since reached a point where erection of permanent high-grade buildings by private interests is now practically at a standstill. Selling prices increased slightly in 1917 but were not sufficient to offset the increased cost of production.

The total value of the limestone and marble sold in the Carthage district in 1917 was $392,443, representing a decrease of 28 per cent compared with 1916 and of 5 per cent compared with 1915 but exceeding the total of any other year. The output of building stone, the principal product, amounted in 1917 to 313,904 cubic feet, valued at $302,411, a decrease of 36 per cent in quantity and 39 per cent in value compared with 1916. The quantity of building stone sold in 1917 was less than in any of the nine preceding years except 1914; the value in 1917, however, was exceeded in only four years, 1909, 1910, 1915, and 1916.

Of the total quantity of building stone sold in 1917, 219,940 cubic feet, valued at $160,350, was rough, and 93,964 cubic feet, valued at $142,061, was dressed or manufactured stone. The proportion of stone dressed by the producers increased greatly in 1915 and 1916, owing largely to the quantity required for the new State Capitol of Missouri. The proportion of dressed stone sold in 1917, though less than in the two preceding years, was greater than in earlier years.

The production of monumental stone in 1917 amounted to 49,819 cubic feet, valued at $58,809, an increase of 97 per cent in quantity and 167 per cent in

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value compared with 1916, the first year in which figures for monumental stone were separately recorded. This increase was in keeping with the conditions of the monumental-stone trade throughout the country and reflected the continuation of the prosperity for a large part of the country which was so conspicuous in 1916. All the monumental stone was sold rough by the producers.

Of the minor products of the Carthage quarries in 1917, flagging amounted to 8,228 square feet, valued at $1,387, a decrease of 18 per cent, and rubble to 1,139 short tons, valued at $1,030, a decrease of 61 per cent. Stone for sugar factories, amounting to 3,169 short tons, valued at $1,491, is included under "Other stone," and other important items under this heading are stone for glass factories, fluxing stone, crushed stone for concrete, and pulverized stone for agriculture. The total value of these products, valued at $31,223 in 1917, increased 56 per cent as compared with 1916.

High Prices for Antique Sculptures

During the past month there has been exhibited in New York and dispersed at auction one of the most remarkable collections of Italian antiques ever brought to this country. This collection was made by Stefano Bardini, and included a number of marble sculptures and terra cotta and colored stucco bas reliefs by the greatest of artists. The prices in many instances made a new record in this line. A fifteenth century glassed terra cotta bas relief by Andrea Della Robbia brought $11,600, and a colored stucco bas relief by Antonio Rossellino sold for $7,600. Various other reliefs in terra cotta and colored stucco by such masters of the Renaissance as the Della Robbias, Donatello, Sperandio, and the like, brought prices ranging from $2,100 to $6,900. A pair of eighteenth century marble flower holders went for $5,900, and a fifteenth century Florentine marble bas relief by Bernardo Rosselino for $6,300. A Parian marble torso of a youthful athlete by Polykleitos of Sicyon, a Greek sculptor of the fifth century B. C., sold for $5,400. The sale emphasized the fact once more than New York is at present the foremost art market in the world.

Distilling Oil from Shale Rocks

In its investigations of richly carbonaceous shales in the United States, made to obtain information concerning shales that may be profitably distilled for their content of petroleum when the oil fields of the country have been more fully exhausted or the prices of crude oil have become higher, the United States Geological Survey has sampled and tested some shales from deposits of unusual interest in Montana. These deposits are not very thick, and their yield of oil is not greater than that of shales now distilled for petroleum in Scotland, but they are somewhat unusual in that the shale contains a considerable amount of phosphate as well as the bituminous matter that is convertible into petroleum. A sample of this shale from Muddy Creek basin yielded 7.5 gallons of petroleum per ton of shale and 15.56 per cent. of phosphate, and a sample from Smallhorn Canyon yielded 24 gallons of petroleum per ton of shale and 2.62 per cent. of phosphate.

Feldspar Quarries in Ontario

Both potash and soda feldspars are found in the Kingston district, the former containing 10 to 12 per cent of potash and the latter as high as 10 per cent of soda, writes Consul Felix S. S. Johnson from Kingston, Ont. Prevailing prices are from $4 to $4.50 per net ton f. o. b. Canadian shipping point. The best time to purchase feldspar is in the winter season, as shorter hauls can be made then over frozen streams and marshes that are impassable in the summer; also, during the winter months more teams are available, as the farmers are not using their horses for field work.

There are at this writing two large grinding plants near Rochester, N. Y., importing feldspar from the Kingston district, and the prospects are that more ginding plants will be built near the border in the near future. The circumstance that the crude stone pays no duty upon entering the United States and the ground spar pays a duty of 20 per cent accounts for the location of the grinding plants in the United States. A cheap rate could be obtained by having the feldspar sent to Kingston by rail, then by water to Oswego. As coal barges from the latter place return in ballast, a low rate could thus be had. The value of feldspar exported from this consular district to the United States in 1917 amounted to more than $100,000; this year's contracts will probably exceed $300,000.

Increased Production of Abrasives

Tremendous expansion in manufacturing in 1917, particularly in the steel and metal industries, is reflected by the increased production of high-grade abrasive materials in the United States. A preliminary compilation by Frank J. Katz, United States Geological Survey, of reports on the production of emery, corundum and artificial abrasives in 1917 indicates a total of 72,276 short tons, valued at $8,325,312, which is an increase of 33 per cent. in quantity and 172 per cent. in value as compared with 1916.

The production of emery from the Peekskill district, N. Y., amounted to 14,842 short tons, very little less than in 1916; the production of corundum in North Carolina was 820 short tons, a large increase over 1916; and the production of crude artificial abrasive materials in the United States and Canada, which are largely prepared for use in the United States, amounted to 57,614 short tons, which was 48 per cent. more than the production in 1916.

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STONE

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VOL. XXXIX MAY, 1918 No. 5

ACCORDING to newspaper reports, the masonic fraternity has just dedicated a new temple in Lancaster, Pa. The description of the building says that it is trimmed with imitation stone. To one who is not a member of the fraternity, this would seem to call for some explanation. The traditional founder of the order was Hiram, King of Tyre, who was called to aid Solomon in the uprearing of the Temple. This master craftsman wrought, not in any sham materials, but in gold and silver, copper and brass, the noble cedars of Lebanon and honest limestone from quarries that can still be traced in Jerusalem. The entire order is symbolical of stone masonry and its ritual is couched in terms of the craft. Some masonic lodges, in their enthusiasm, have gone to the expense and trouble of bringing blocks of stone from these identical quarries in Jerusalem to serve as their altars. Does it not seem a bit of mockery for masonic ceremonials to be conducted in a temple made of imitation stone? "Plumb, level, square"; can it be all of these, and yet a mere sham?

THE report of the New York State Department of Labor for the month of March shows that the stone, clay and glass products group, comprising in the main those materials used in building and construction work has been declining steadily since last May. March showed some improvement over February, but had 14 per cent less employees than March, 1917. The building departments of the ten first- and second-class cities reported, for March, 1918, that every one of these cities, except Yonkers, issued less permits for building construction than for the corresponding month of 1917. This decrease in the estimated cost of work to be done was 61 per cent for all these cities combined, with Schenectady as lowest at 15 per cent less and Binghamton as highest at 73 per cent less. New York City reported a decrease of 63 per cent, to which each borough contributed. On the other hand, there was a 24 per cent increase for March, 1918, as compared with Feebruary, 1918. Albany was the only city which showed a loss for that period. Although New York City increased by 21 per cent from February to March, Manhattan Borough reported a slump of 42 per cent.

WAR conditions have seriously affected many lines of business, and readjustments are found necessary in almost all trades. A very sensible note of warning is sounded by Roger W. Babson, who says: "Some concerns have become demoralized by the industrial upheavals caused by the war and are deserting their normal trade or even going out of business altogether. We have continually pointed out various practicable methods of readjustment, but we caution clients not to throw away their enterprises in a panic. With a continuation of the war for several years longer, which is entirely possible, conditions in many lines will become even more arduous; but the concern which has the courage and strength to hold on will win a position of advantage well worth the struggle. The outlook is that transportation will be the chief difficulty. This is now the limiting industrial factor and will remain the chief cause of scarcity of materials and merchandise." There is no need for hysteria. The country has never been as prosperous as at present, and it can see this war through, no matter how long or costly it may be, without sacrifice of its commercial supremacy. When the end finally comes there will be such a boom in our business as the country has never known before, and we must be ready to take advantage of our opportunities.

AS THE war progresses there is a steadily growing restriction of articles that may be imported from foreign countries. The War Trade Board announces that no import licenses for shipments made after May 13, 1918, will be granted for certain articles, except as specifically provided. Licenses for lime, talc and soapstone will be granted only for shipments coming from Canada, and for cement for building purposes and for stone and manufactures thereof only for shipments coming overland or by lake from Canada or coming overland from Mexico. It is explained that these provisions authorize the importation of the specified articles only when the goods originate in one of the countries designated in the particular provision covering such article, and do not permit the importation of goods originating in other countries, but coming through such designated countries. The interpretations prepared by the Bureau of Imports contain the following as to stone and manufactures thereof: "All articles specified in or classified under paragraphs 97 and 99:

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also all articles specified in or classified under paragraph 98, except articles composed wholly or in chief value of agate, rock crystal, or other semi-precious stones as specified therein; also building stones in forms, classifiable under paragraphs 81 and 549; also freestone, granite, sandstone and limestone specified in or classified under paragraph 614 and stone sweepings classified under paragraph 614."

GOVERNMENT reports declare that this country is suffering from a shortage of clay, due to the monopolizing of our ocean-going ships for war purposes. A large part of the high grade clay used in this country comes from England, and besides the cargo space it uses, another drawback to its importation is the fact that it requires considerable time for loading. This country contains very extensive clay deposits, and much of it is of excellent quality. There would seem to be an especially favorable opportunity just at present to develop another native resource. But the government sounds one note of warning. It says: "Domestic producers do not mine their clay quite as cleanly as their English competitors. Nor is the domestic clay as uniform in character. It will not bring the high prices paid for English clay. But more could be sold if it could be produced and carried to its market. Still more could be marketed if cleaner, more uniform, clay were produced, for in that event the consumers would use a greater percentage of domestic and correspondingly less English clay in their mixtures." Fortunately, it is a fact that far less English clay is necessary to proper manufacture of paper than is now used. Besides domestic clay there are many other substances of domestic origin that could be used in the body, not the finish, of this paper. Also over half of the English clay we use is consumed in making paper. So that if a shortage of English clay should develop it would not be highly serious until the shortage became very great, until there was only a half of the normal supply or less available.

IN a recent address before the Americanization Conference in Washington, Secretary Franklin K. Lane said: "Now there are several things which we have come upon recently which seem to those of us who have not been wise to be discoveries. The first is that we have a great body of our own people, five and a half millions, who cannot read or write the language of this country. That language is English. And these are not all of foreign birth. A million and a half are native born. The second is that we are drafting into our army men who cannot understand the orders that are given them to read. The third is that our man power is deficient because our education is deficient. The fourth is that we ourselves have failed to see America through the eyes of those who have come to us. We have failed to realize why it was that they came here and what they sought. We have failed to understand their definition of liberty." In the stone industry many aliens are employed who do not understand or speak the English language. Quarrying is classed as one of the hazardous occupations, and the ability to comprehend commands in the vernacular is essential to safety. It is up to the employers to see that this condition of affairs is remedied as rapidly as possible, and that a large majority of their men can understand the language. Many employers have found the knowledge of English such a valuable addition to the worker's efficiency that increased pay or promotion are given to those who learn the language. Other firms have classes in the plant on company time, and regard this measure as business efficiency, not as philanthropy. Instruction in the duties of citizenship should go hand in hand with the teaching of English. The advantages of becoming naturalized should be brought home to the alien, and he should be encouraged to take out first papers and should be taught the legal forms for securing final papers.

Building Operations in Leading Cities

The Government has been compiling statistics of building operations in some of the leading cities for 1916. Efforts were made to obtain detailed information from 153 cities, but the figures were fairly complete for only 129 cities. The figures show that on the whole the building industry was in more prosperous condition than in 1915, though six cities that showed increase in 1915 showed decrease in 1916. The most noteworthy features of the building industry in 1916 were the large increase in the cost of building operations in the Borough of Manhattan ($60,405,370) and other large cities and the general increase in the average cost per permit or building.

Various causes are assigned for these changes. In many cities the increase in the building operations is ascribed to the general prosperity. In the Borough of Manhattan, New York, the great increase is ascribed by the superintendent of buildings to the passage of an ordinance restricting the use, height and area of buildings by zones. In anticipation of this ordinance many plans were filed to escape its provisions. Manhattan showed the largest increase, but the Bronx and Brooklyn showed decrease. No report was received from the Borough of Queens. Boston showed the second largest increase. Much of this large increase may be more apparent than real, as the method of recording building statistics in Boston was changed in 1916 and credit was given to that year for a large amount of building which might have been credited to 1915.

Forty-nine of the cities given in the first table showed increase, and nine showed decrease in the total cost of building operations. Twenty-five cities that showed decrease in 1915 rallied and showed increase in 1916, 24 showed increase in both years, and only

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3 cities showed decrease in both years, the net increase being $196,127,904, or more than 28 per cent. The largest proportionate increase was in Chester, Pa.—304 per cent. The largest decrease was in Cincinnati—$2,600,519, or 19 per cent.—though if the Bronx is considered as a separate city it showed the largest decrease—$10,926,066—and also the largest proportionate decrease, 37 per cent.

The cost of building operations in these cities in 1916 ranged from $3,086,871 in Houston to $199,232,176 in Greater New York, the average for these 58 cities being $15,281,633.

The total number of permits or buildings increased 37,163 in 1916. They ranged from 591 in Sioux City, Iowa, to 26,585 in Greater New York. The average cost per operation in these 58 cities was $3,421 in 1916 and $3,110 in 1915. In Greater New York the average cost was $7,494 in 1916 and $5,948 in 1915; in the Borough of the Bronx it was $4,997 in 1916 and $7,360 in 1915; in Brooklyn it was $2,563 and $3,142 in 1915; in Manhattan it was $30,143 and $19,773, and in the Borough of Richmond it was $2,281 in 1916 and $897 in 1915. In Chicago, the second city in the cost of building operations, the average cost was $10,979 in 1916 and $9,409 in 1915; in Detroit, the third city, it was $3,097 in 1916 and $3,595 in 1915; in Philadelphia, the fourth city, it was $3,598 in 1916 and $2,522 in 1915; and in Boston, the fifth city, it was $5,440 in 1916 and $4,601 in 1915.

Stone Houses in Italy

Beds of excellent clay suitable for brick and tile making, good building stone, and limestone capable of yielding fine qualities of lime and cement are to be found in almost every part of Italy, writes Consul F. T. F. Dumont, from Florence. Centuries of scarcity of lumber have developed methods of construction in which a minimum of lumber is used. A surplus of labor has kept wages at a point that makes stone and brick construction possible at prices that would seem incredibly low in new countries. Good modern houses are built almost entirely of stone, brick, and plaster. Stone is used for foundations, walls and partitions and brick for finishing door and window openings and topping walls where suitable stone can not be found, while plaster is applied directly to the exterior and interior walls for finishing purposes. Floors are composed of light iron I beams, suitably spaced, between which a flat arch of hollow tiles is laid, the top of the arch being slightly below the top of the beam while the bottom projects below the bottom of the beam. The floor is either cement sufficiently deep to give a uniform surface, which is painted, or else a cement base in which tiles can be laid. Interior walls are kalsomined. Moldings, baseboards, cornices, steps, etc., are done in stone or cement, as are door and window sills. All interior ornamentations are in plaster of paris or cement. Roofs are flat and tiled like floors. Ceiling plaster is applied directly to the arch tiling. New buildings usually conform in style to those erected in former centuries. Only doors and window frames and shutters are of wood.

Denver's Civic Center

Denver acquired for a civic center nine acres of valuable ground in the heart of the city, opposite the capitol buildings, nearly a decade ago. Upon the proper beautification of the tract experts have differed; and the result has been that the tract was not consistently improved. Work begun last year under Mayor Speer, however, is expected to be finished before the close of 1918, and to leave the center complete. It will contain an open-air Greek theatre seating 5,000 people, partly done in marble and granite. There are to be gardens, lagoons, statuary and balustrades, the whole costing over $2,000,000 in addition to donations from citizens. Two residents of Denver have given two bronze figures—a bucking broncho and an Indian scout—by the Western sculptor, Proctor; and another has contributed an ornamental gateway costing $100,000.

Notes from the Stone Fields

MARBLE AND GRANITE

The Herter & Leins Monument Company, of Marshalltown, Ia., has made additions to its plant that will virtually double its capacity in order to take care of its constantly increasing business.

The contract for wainscoting and marble work on the third floor of the city hall at New Haven, Conn., has been awarded to A. U. Sasso, of that city.

The largest shipment of granite ever sent from Vermont went out on the Montpelier and Wells River Railroad in the two weeks starting March 13. Two hundred freight cars loaded to their capactiy containing more than 6,400 tons of finished product went out of Vermont. The value of the product was more than $1,500,000.

The docks of the Vermont Marble Company, at Tacoma, Wash., have been taken over by the Seaborn shipyards for the rigging and outfitting of the first of their standard type vessels built for the United States Emergency Fleet Corporation.

Richmond, Va., will soon begin expending a large sum of money for street improvements, including granite paving and curbing.

Adilio Nativi, aged twenty-one years, a granite cutter of Barre, Vt., was instantly killed recently, when a ten-ton block of granite n which he was chiseling became unsettled from its base and toppled over to the ground. The man saw the great stone start to topple and jumped, but was not quick enough, the stone crushing him to death.

Among recent acquisitions at the Metropolitan Museum of Art, New York, is a sculpture of Vishnu from a temple in Kikkeri, in the Mysore district of India. The work is supposed to have been executed in the twelfth century.

Property holders in Atlanta, Ga., are agitating in favor of using granite curbing when the streets are repaved. The board of public works will lay the curbing without cost if it is furnished by the property owners. A member of the committee having the matter in charge calls attention to the fact

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that while ordinary rubble curbing will be laid by the County without extra cost under the present contract, the highway will be much more satisfactory, both in efficiency and sightliness, if granite curbing is used. Practically all of the property owners on the leading thoroughfare have signed the petition for granite curbing.

Granite contains nearly all food necessary for many plants. Therefore, freshly ground granite is a good fertilizer, says an exchange.

About 200 stone cutters and quarrymen at Lithonia, Ga., recently went out on a strike, the suspension of operations being due, it is said, to a dispute over the wage scale. It is declared that the men want an increase of 20 cents per day until May 1, and then another increase of 60 cents, making the total daily wage on that date $4.80. The present wage is $4 per day, it is understood. The quarry operators, it is stated, have offered a compromise, providing for an increase to $4.40 per day until July 1 and an increase at that time to $4.80. Negotiations are in progress.

LIMESTONE AND SANDSTONE

The Kingwood Stone Company has just been incorporated to operate the quarries at Kingwood, Preston County, W. Va., formerly owned by the Kingwood Quarries Company. The stone is a quartzite of antique yellow color, used in the Synod House of the Cathedral of St. John the Divine, the Potter chapel, the Russell Sage Memorial building, and other important structures in New York and vicinity. The new people who have taken over the enterprise represent banking interests at Morgantown, W. Va., which were large holders of the bonds of the defunct company.

The new 5-story addition to the Hospital of the Good Shepherd, in Syracuse, is in Indiana limestone, supplied by the Patten Cut Stone Company, of that city. The hospital is now one of the largest and most modern in the State.

Limestone for repairing the roads of Floyd County, Ind., will be obtained from the American Rubbing Stone Company's quarry north of New Albany, for which a contract has been made by the board of commissioners at 7 cents a cubic yard. It is estimated there will be three cars of stone taken from the seven-foot ledge at the quarry daily, and it will be crushed there by the County's machine and distributed from that point. Rock was purchased heretofore from along the Southern Railway, west of the city, and the traction company, east of New Albany, and by using the material nearer a saving in cost will result.

One of the largest moving picture theatres in Greater New York has just been completed at Bedford Avenue and Brevoort Place, Brooklyn. The exterior is of tapestry brick with limestone trimming.

A premature blast at the quarry of the Birdsboro Stone Company, at Monocacy, Pa., recently killed two of the workmen. It is supposed that one of the men dropped a stick of dynamite.

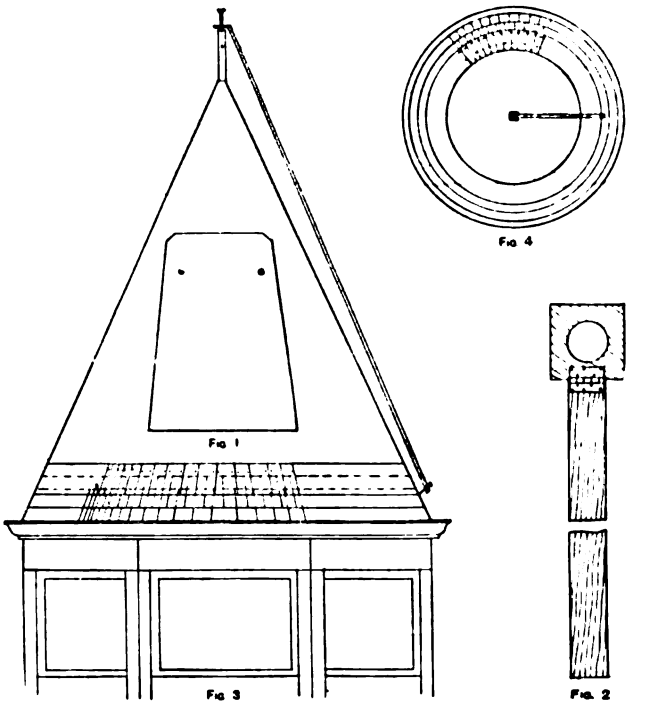
The annex to the Treasury Building, in Washington, will be erected in gray Indiana limestone.

Slating a Conical Tower

In this article it is proposed to show the methods of slating a conical tower with slates of irregular sizes. Two methods are open to the slater, namely, (1) By means of a trindle; (2) by striking a line on the slates when they are on the ground. The slates for a tower should be carefully selected, specially dressed (as shown in Fig. 1 to suit the style of roof, and carefully sized by means of the pin rule, says the *Building World*, of London.

The trindle (Fig. 2) is made with a piece of wood 4 in. square, a slater's lath, and a hinge. Bore a hole in the centre of the square piece of wood and fix the lath and the wood together with the hinge and screw nails. Care must be taken to invert the hinge so that the lath may be lifted up over any obstacle such as scaffolding. If there is no centre rod in the centre pole of the tower, an ordinary round chisel may be fixed in the centre pole, over which the trindle is slipped, so that it may run round with a fair degree of accuracy.

The lath of the trindle is usually made to suit first the full depth of the roof, and is gradually shortened as each course is put on, the piece being sawn off to suit the slater's gauge, which gives the amount of weather and also the amount of cover. Through this lath a nail is driven, and the trindle is



taken round the tower scratching a line on the course of slates already put on. Fig. 3 shows the elevation of the tower, and three courses of slates, with the trindle fixed and set to the line of the third course. Fig. 4 shows a reduced plan.

Method (2) is done by laying the slates on a flat plank, with the tails butting against another plank laid on edge against it. A set is marked by means of the gauge at each end of the row, and a chalk line struck through the sets. The slates are then carried to the roof and put on.

Business Brevities

Residents of Northeast Minneapolis, who object to operation of the Minnesota Crushed Stone Company's plant at 1500 Johnson Street northeast, were denied an injunction preventing operation of the crusher, by the district court. The case will come up for regular trial on May 18. Attempts have been made by residents of that section of the city to force action by the council, but the council so far has been unable to find a legal way in which to do so.

The stock of the Toledo, O., Mantel & Tile Company was damaged to the extent of $10,000 by fire recently.

The O'Brien Stone Company, of Bellefontaine, O., has increased its capital stock from $40,000 to $60,000.

A. P. Sandles, secretary of the Ohio Macadan Association, was elected executive secretary of the National Crushed Stone Association at a meeting held in Chicago recently.

The Conkey Sand & Gravel Company, of Oregon, Ill.,

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which bought out the Lerrke Company plant last year, has a force of men getting it in order to run. They have added much new machinery and equipment. They have plenty of market for all their output and expect a very busy season.

The Granite, Sand & Gravel Company, of Indianapolis, Ind., has increased its capital stock from $40,000 to $70,000.

The Union Stone Company, of Vincent, O., has increased its capital stock from $20,000 to $35,000.

The Nassau Sand & Gravel Company, of New York, has increased its capital stock from $10,000 to $200,000.

The Elmhurst Chicago Stone Company, of Elmhurst, Ill., has increased its capital stock from $75,000 to $125,000.

Quarry Notes

The H. B. Sproul Construction Company, which has a contract for road work, is erecting a crushing plant at the James Duell quarry in Glenville, Westchester County, N. Y. The stone will be taken from the crusher to the highways to be improved by automobile trucks.

Madison, Wis., has not yet opened the municipal quarry this year, but has purchased stone needed for highway improvement in the open market. The mayor will appoint a committee to investigate the cost of reopening the city quarry.

The stone quarry at Belgium, Ozaukie County, Wis., has begun operations for the season.

The Marquette Stone Company has decided to operate its quarry west of Marquette, Mich., and has a force of men at work. Repairs have been made to the crushing plant. The company will supply stone for road work in Marquette and throughout Green Bay County.

New Companies

The Wege-Stanford Marble & Tile Company, of Indianapolis, Ind., to manufacture and sell sawed and finished marble. Capital $5,000. Directors: G. C. Wege, A. D. Stanford, E. Stanford and O. Wege.

The Eastman Quarry Company, of Rutland, Vt., to quarry and deal in marble. Capital $100,000. Incorporators: Wallace C. Clement and Walter S. Fenton, of Rutland, and Henry G. Smith, of New York City. The company will employ 200 men.

The Lake Erie Sand Company, of Sandusky, O., to deal in sand, stone, etc. Capital $150,000. Incorporators: William Hendrickson, Alfred Hendrickson, Henry Gerhardstein, Louise Starbird and Louis Werner.

Raritan River Sand Company, of Millville, N. J., to deal in sand, stone, gravel, etc. Capital $25,000. Incorporators: Edwin S. Gleason, New Brunswick; D. E. Corbett, Matawan, and George S. Murray, Metuchen.

The Cook Stone Company, Hopkinsville, Ky., to do a general stone business. Capital $50,000. Incorporators: James O. Cook, J. T. Edmonds and Sam Frankel.

The Boston Crushed Stone Company, of Boston, Mass., to quarry and crush stone. Capital $10,000. Incorporators: Gertrude Hyan, Simon E. Duffin and John J. Graham, Boston.

Wissota Sand & Gravel Company, of Eau Claire, Wis., to deal in sand, stone, etc. Capital $30,000. Incorporators: Louis Arnold, Andrew Larson and Allard Rowe.

Ohio River Sand & Gravel Company, of Cincinnati, to deal in sand, stone, etc. Capital $50,000. Incorporators: C. J. McDiarmid, S. Galbraith, E. J. Burke, S. W. Lloyd and H. A. Lloyd.

The Little Falls Black Granite Company, of Little Falls, Minn., to quarry and deal in granite. Capital $75,000.

St. Lawrence River Granite Company, Inc., of Carthage, N. Y., to quary and deal in granite. Capital $25,000. Incorporators: H. B. Kelly, Clayton; E. C. Crooks and F. J. Crooks, Carthage.

Old Hickory Clay & Talc Company, of Paducah, Ky., to quarry talc, etc. Capital $25,000. Incorporators: C. E. Jennings and others.

Millville Stone & Lime Company, of Millville, Pa., to operate quarries and lime kilns in Pennsylvania and West Virginia. Capital stock $535,000. Incorporators: E. J. McKenna, W. H. Lemon, E. B. Strassburger, K. R. Connolly, of Pittsburgh, and E. R. Sullivan, of Crafton, Pa.

W. W. Ballantine Company, of Cleveland, O., to do a general stone business. Capital $25,000. Incorporators: W. W. Ballantine, R. A. Heiser, W. P. Hurst, J. S. King and M. W. Berkey.

Kingwood Stone Company, of Kingwood, W. Va., to operate quartzite quarries in Preston County, W. Va. Capital $100,000. Incorporators: Joseph L. Keener, Harold G. Hodges, Cassius C. Brown and George C. Stoele, of Morgantown, W. Va.

Construction Notes

Acton, Ontario, is contemplating the erection of a Carnegie Library Building.

The congregation of Notre Dame Du Bon Pasteur, of Montreal, Can., will erect a new church.

The general contract for the erection of a 4-story stone addition to the convent for Soeurs des Saints Coeurs Jesus-Marie, 28 St. Louis Street, Joliette, Quebec, has been awarded to Albert Giroux, of St. Casimir.

E. I. Wilson, 101 Tremont Street, Boston, has prepared plans for an 8-room school building at Medford, Mass.

The Merchants Bank, of Canada, will erect a stone banking building, costing about $150,000, on King Street, W., Toronto, Canada.

A school and assembly hall will be erected at the State Normal School, New Britain, Conn., after plans by Davis & Brooks, Hartford.

A new high school building at Whiteboro, N. Y., will be erected, after plans by Pember & Campaigne, Albany.

The contract for the erection of a new exchange building for the Chesapeake & Potomac Telephone Company, at Washington, D. C., has been awarded to S. J. Prescott & Co., of that city. The amount involved is more than $800,000.

The contract for the erection of an Exposition Building at Wichita, Kan., has been awarded to G. H. Sudhoff Construction Company, Kansas City, Mo., at about $150,000.

Two barracks at the New York Soldiers' and Sailors' Home, Bath, N. Y., will be rebuilt, at a cost of about $100,000.

A 3-story stone and brick college building will be erected at Fort Williams, Ont., after plans by R. E. Mason, of that city.

H. Beck, Municipal Building, Buffalo, N. Y., is preparing plans for a 2-story school building in that city, to cost about $225,000.

G. G. Creighton, Halifax, is preparing plans for a $200,000 school building at Dartmouth, N. S.

The State Hospital Commission, Albany, N. Y., will build additions to the Manhattan Hospital at Randalls Island, costing about $700,000.

R. A. Herold, Sacramento, Cal., is preparing plans for a $150,000 hospital for Sacramento and Placer Counties to be erected in Sacramento.

It is estimated that the cost of the new prison at Wingdale, N. Y., will be about $1,750,000.

A. Meyers, Seventh and Locust streets, St. Louis, is preparing plans for a synagague for the B'Nai Amoona congregation, of that city.

Shattuck & Hussey, 19 South La Salle Street, Chicago.

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have prepared plans for a $300,000 Y. M. C. A. Building at Bayonne, N. J.

C. H. Johnson, St. Paul, Minn., has prepared plans for a $500,000 Nurses' Home in that city.

The city of Hazelton, Pa., will receive bids about June 1st for the erection of a $100,000 school building, after plans by E. E. Joralemon, of Buffalo, N. Y.

The Minnesota Masonic Home Association will erect a home and hospital in St. Paul, to cost about $130,000.

G. S. Idell, 34 South Sixteenth Street, Philadelphia, has prepared plans for a hospital building at Phillipsburg, Pa.

The Schwind Realty Company, of Dayton, O., will rebuild the Victoria theatre, store and office building in that city, at a cost of about $100,000.

Ballinger & Perrot, Arch and Seventeenth streets, Philadelphia, are preparing plans for a housing development at Wilmington, Del. The scheme calls for more than 500 houses as well as public work. The cost will be about $2,500,000.

S. Hannaford & Son, of Cincinnati, are preparing plans for a $250,000 hospital building at Memphis, Tenn., for the Methodist Hospital Association.

Chappell & Hunter, Charlottetown, N. S., have completed plans for a $100,000 Roman Catholic Church at Sydney, for which bids are now being received.

J. W. McNeill, 171 Manufacturers Street, Montreal, has the contract for the marble and tile work in the new $183,000 high school at Montreal West.

Jobin & Genois, 113 Cote d'Abraham Street, Quebec, have the contract for furnishing granite columns for the new $150,000 church that is to be erected in the Parish of Limoilou, Quebec.

R. T. Walker and L. T. Waid, New York, have prepared plans for an addition to the Dime Savings Bank, Fleet and DeKalb Avenues, Brooklyn.

Bids will be received until May 30th for a school building, to cost about $125,000 at Princton, Minnesota. The plans are by Foss & Foss, Elbow Lake, Minn.

Greeley, Col., and Windsor, Col., will build additions to their high schools, each to cost about $100,000.

John Russell Pope, New York, is preparing plans for a marble and limestone church, costing about $175,000, for the University Baptist Congregation, of Baltimore.

The contract for the erection of the Middlesex County Hospital at Waltham, Mass., has been awarded to J. P. Keating, Westboro, at $482,000.

The Canadian Pacific Railway is contemplating extensive alterations to its hotel, Chateau Frontenac, at Quebec. About $500,000 will be expended.

The Y. M. C. A., of Florence, Ala., is planning the erection of a $100,000 building.

The contract for the erection of a 12-story banking and office building, costing about $500,000, for the Central Trust Company, of San Antonia, Tex., has been awarded to J. P. Haynes, of that city.

The central Y. W. C. A., of Montreal, is planning a $150,000 addition to its building.

The army and navy veterans, of Cleveland, O., will erect a stone memorial building, 3 stories high and costing about $500,000, on the Mall, in that city.

Magney & Tulser, of Minneapolis, are preparing plans for an $80,000 church building for the Lutheran congregation, of Fargo, N. D.

The Masonic bodies of Detroit, contemplate the erection of a temple in that city.

Walker & Weeks, 1900 Euclid Avenue, Cleveland, are preparing plans for a banking and office building, with stone front, for the Central Savings & Trust Company, of Barberton, Ohio.

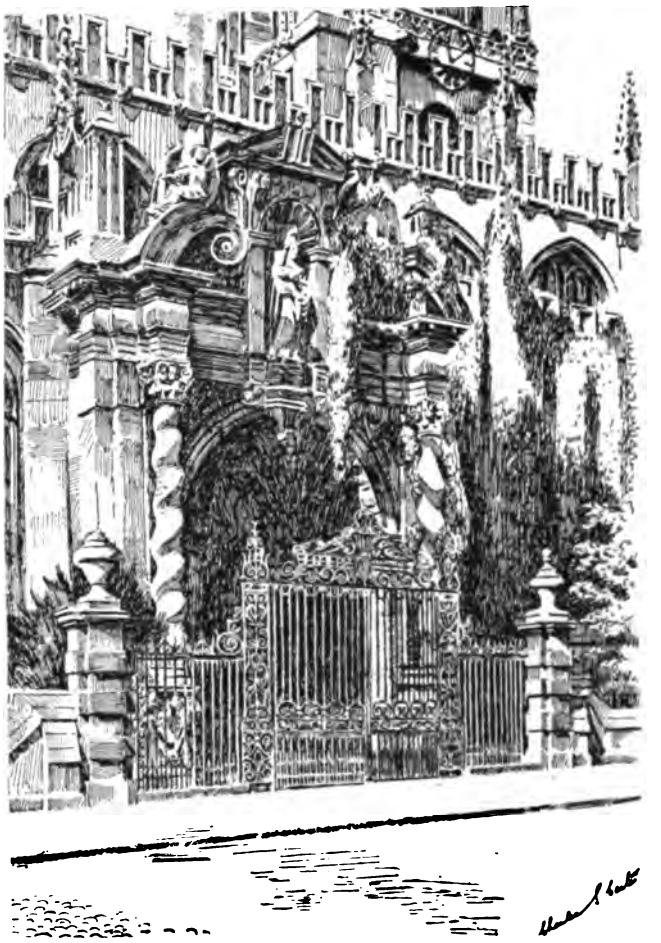
St. Hyacinth's Congregation, of Detroit, are planning the erection of a church, rectory and school, to cost about $300,000. The plans are by E. Brielmaier & Sons Company, Milwaukee.

Mobile County, Ala., will erect a $150,000 agricultural high school at Wilmer.

Spencer County, Ind., will receive bids June 3 for the erection of a 3-story court house at Rockport, to cost $150,000. The plans are by E. B. Dunlap, Indianapolis.

Plans are on foot for the erection of three large hotels in St. Paul. J. M. Sanford will erect a 12-story building, costing about $2,000,000; the Booth Hotel Company, a 12-story building, costing about $1,500,000, and the Minor Hotel Company, a 16-story building, to cost about $1,000,000.

Bids will be received about August 1 for the erection of a church at Dayton, O., to cost about $175,000, for the Grace M. E. Congregation. The plans are by Schenk & Williams, Dayton.



South Porch, St. Mary's Church, Oxford, England
Designed by Inigo Jones in 1637, and restored in 1865 by Sir Gilbert Scott. From a sketch by Charles S. Carter, in the London *Architect*

The contract for the erection of the 3-story stone and brick building for the Y. M. C. A., at Lewistown, Pa., has been awarded to Steinbach & Sons, of that city.

Milwaukee, Wis., will erect a police station, to cost about $250,000.

A $100,000 school building will be erected at Jerome, Ariz.

All bids for the erection of a high and grade school at Groton, S. D., have been rejected and new bids are called for.

The beautiful new church of St. Christopher, at Baldwin, L. I., was recently dedicated. This is built of stone taken from the old Milburn reservoir.

Bids will be received about May 15 for the erection of a

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3-story addition to the high school building at East Chicago, Ind., to cost about $125,000. The plans are by J. T. Hutton & Son, of Hammond, Ind.

Albany, N. Y., is to erect a new public school building on New Scotland Avenue, of pressed brick with stone trimmings. The plans are by Fuller & Robinson, Albany.

Obituary Notes

P. H. McCue, vice-president of the Great Marble Company, of Milwaukee, and one of the most widely known marble men of the Middle West, died at his home in Chicago the past month, at the age of 58 years. Mr. McCue was president of the Chicago Marble Dealers' Association. He was born in Ireland and for many years had been identified with the marble interests. He is survived by a widow, two daughters and five sons. Mr. McCue had a wide acquaintance in the trade and was held in the highest esteem.

Jacob E. Robinson, secretary-treasurer of the American Marble & Granite Company of Tacoma for the past fifteen years, and a resident of that city for thirty-three years, died the past month at the age of 76 years. He was a native of New York State. His son is president of the marble company.

Business Embarassments

Three concerns have filed an involuntary petition in bankruptcy against the Lantz Company, which conducts marble works at 861 Main Street, Buffalo, N. Y. It is alleged in the petition that the marble company allowed creditors to obtain a preference by securing judgments.

At a sheriff's sale, sixty-seven shares of the Independent Lime & Stone Company, of Eden, Wis., were purchased by William Nast, of Eden, for $4,600. The sale was the result of a judgment obtained against Herman Nast and the Lime and Stone company.

The property of the Flint Granite Company, consisting of about 13 acres at the entrance of the Rural Cemetery, Albany, N. Y., was bid in by a representative of Charles H. Sabin for $33,000 at a foreclosure sale. The mortgage was for $12,000, and was held by Mr. Sabin, formerly of Albany, but now of New York.

Joseph Bewley has been appointed receiver for the Spalding Quarry Company, which operates a large quarry north of Atchinson, Kan. The quarry, which employes about 20 men, will continue in operation as it has many contracts on hand and also has some Government contracts. James Spalding, who has been in charge of the company, asked for the appointment of a receiver as a protection for the creditors. Mr. Spalding says the concern owes but $12,000 and that its assets are $42,000. A receiver will be enabled to borrow additional funds to continue the quarry. Considerable stripping of rock needs to be done and this requires the expenditure of more money. However, as soon as the stripping has been done it is believed that the business will make a good showing. The quarry made money last year but the river shifted and the profits had to be expended in the sinking of a large well from which to obtain water with which the stripping is done.

Trade Notes

The new Pollard openside junior jointer is a small, self-contained machine, built to suit the requirements of the smaller shops, but giving the same perfect joints as the large machine. By the use of this jointer slabs can be polished first and then jointed without the necessity of putting the slab on the rubbing bed in order to get a true and straight edge. The bed is six by four feet in size, and the arbor takes wheels up to 16 inches in diameter. The machine is splendidly adapted for cutting tiles or for working over second-hand slabs into bases, etc. It is either motor or belt driven and requires only ten to fifteen horsepower for operation.

Announcement is made that, for the purpose of promoting production and reducing expense, the marble business heretofore conducted by and in the name of John M. Ross, has been sold to the Knoxville Marble Company, of which Mr. Ross is president. Hereafter the entire business of both these organizations will be conducted under one management, and all contracts and unfilled orders of the former business will be completed by the Knoxville Marble Company.

Beginning with May 1, the headquarters of the National Association of Marble Dealers, formerly in the Marbridge Building, New York, were transferred to Milwaukee, Wis. The secretary of the organization is Victor Mosel.

A year or two ago mention was made in these columns of a new circular granite saw that had some unique features. This has been still further perfected, and the accompanying illustration shows the actual saw. This has de-

Circular Granite Saw

tachable teeth and a positive and adjustable feed that will deliver the shot as required at the point of contact. The teeth are drop-forged and can readily be replaced at small cost. A special feature is to be found in the grooves on the forward and reclining edge of the teeth. Through these the saw, by centrifugal action, throws the shot continually outward against the stone, and the grooves direct the abrasive to the center of the saw face, where it does its work.

The Tompkins-Kiel Marble Company, 505 Fifth Avenue, New York, has a shipment of Italian, Tavernelle and Rosato marble in blocks of various sizes. The stock of foreign marbles is naturally very low at this time.

By a recent election, Charles Philip Coleman, who has been vice-president of the Worthington Pump and Machinery Corporation since 1916, has been advanced to the presidency of that organization. He was, prior to that, receiver of the International Steam Pump Company and Associate Companies, which have now been reorganized into the present corporation, which owns and controls some of the best equipped works in the country and is the leading interest of the world in pumping machinery and affiliated lines.

Mr. Coleman was born in Baltimore and has had a long experience in various engineering and railroad fields. He was made secretary and treasurer of the Singer Company in 1903, and during his incumbency of that position had charge of the construction of the Singer Building. The Worthington Corporation has eight large plants in this country, and a European works, and is turning out many products for this country and its allies in war works.

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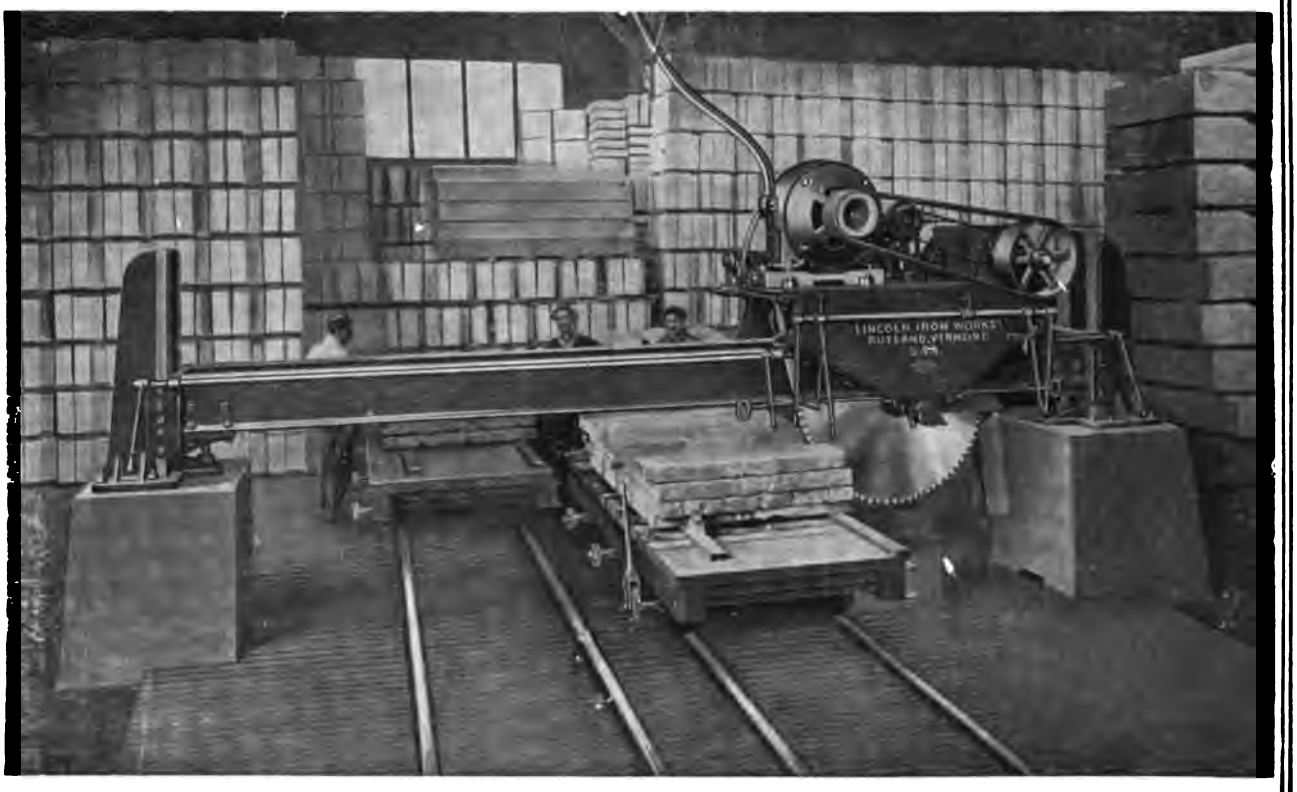

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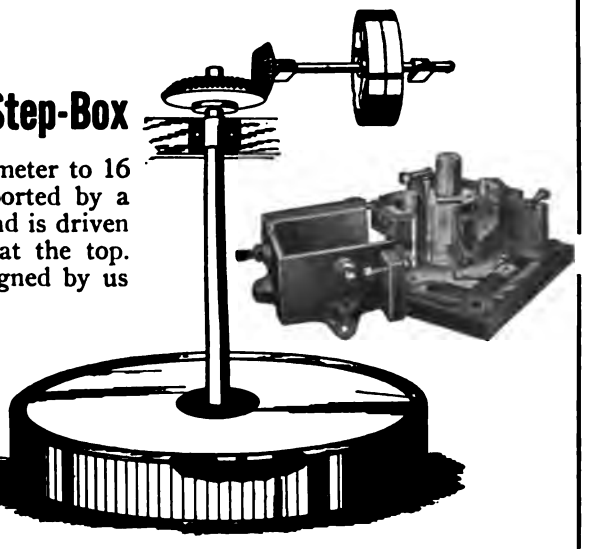

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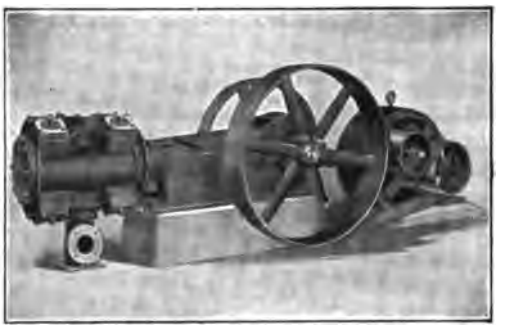

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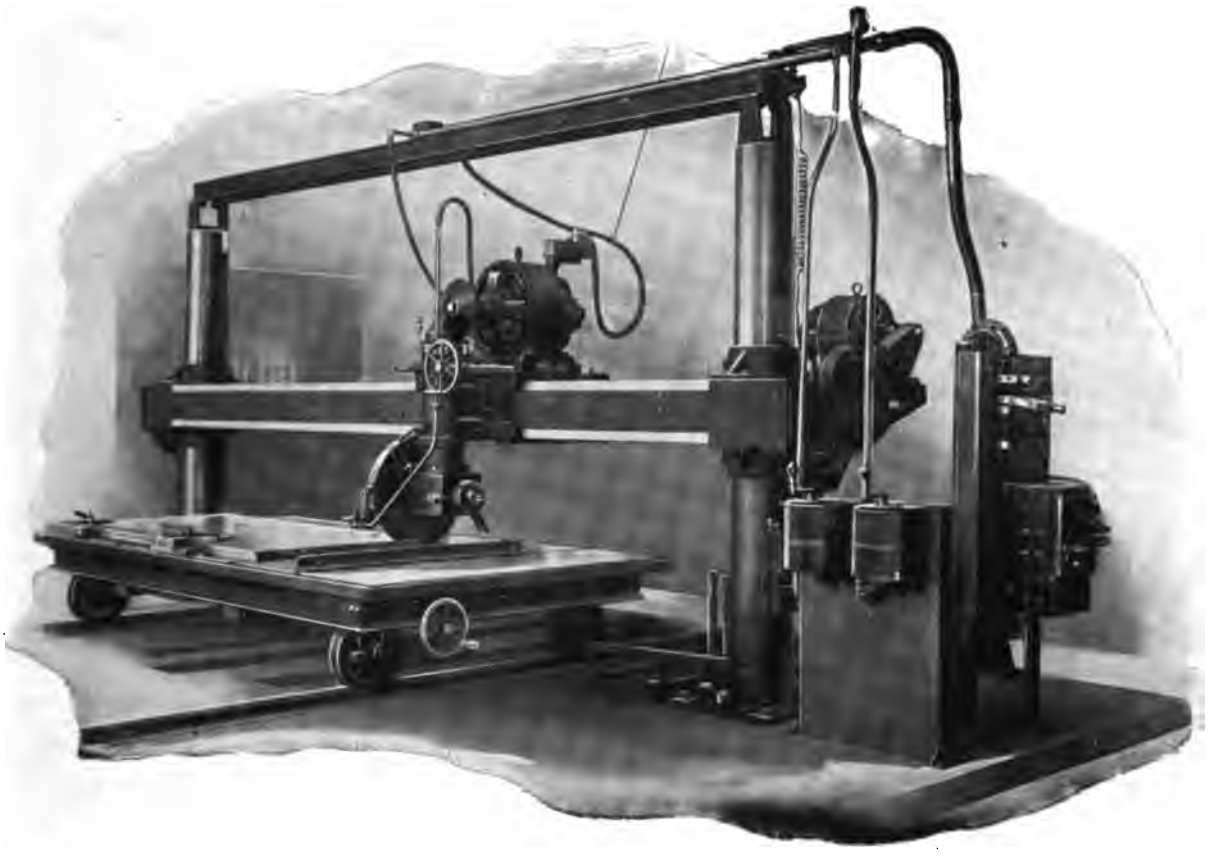

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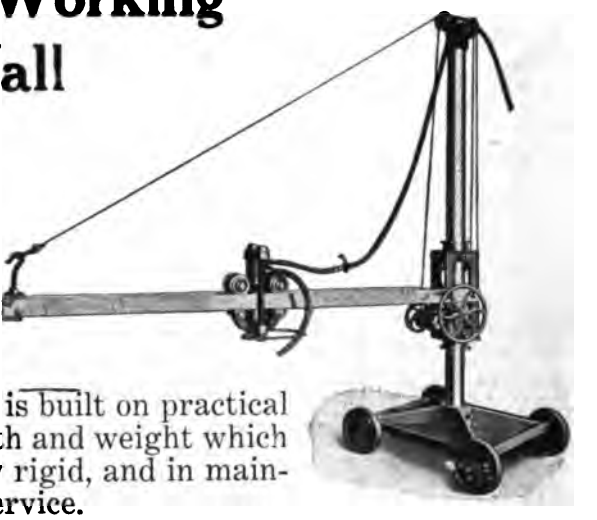

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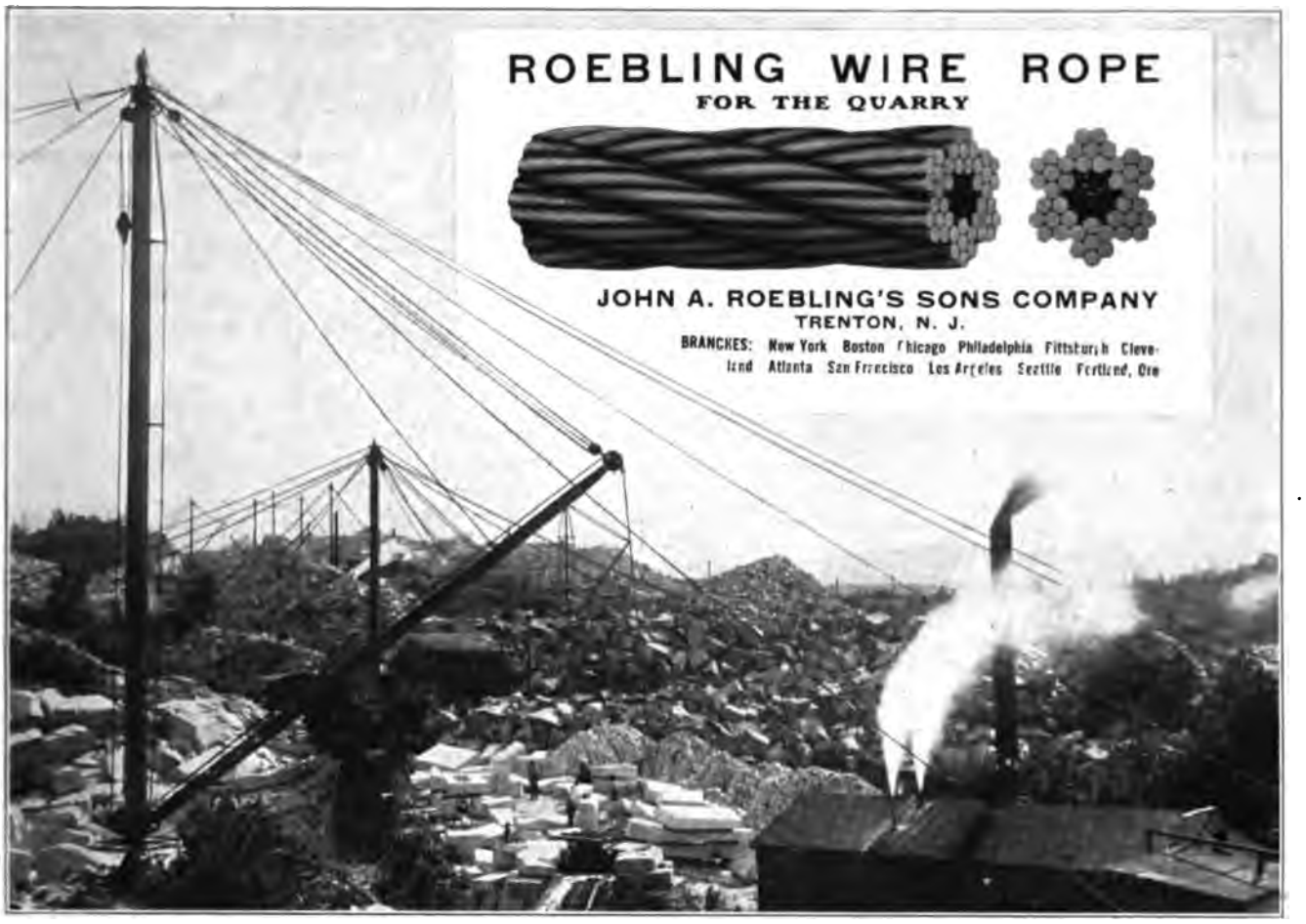
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CONTENTS

	PAGE
GRANITE FOR PAVING	267
ROMANCE OF STONE	268
CANADIAN ASBESTOS	268
ACCIDENTS IN QUARRY OPERATIONS	269
STONE BARNS OF ENGLAND	271
INDIANA BUILDING STONE	271
PUMPS FOR QUARRY SERVICE, *illustrated*	272
STONE HOUSES OF PENNSYLVANIA	273
STATE ASSISTANCE IN HOUSING	274
QUARRYING OF PHOSPHATE ROCK	274
GRAPHITE NEEDED FOR WAR PURPOSES	275
PLASTER OF PARIS FOR ART AND OTHER WORK	275
MONUMENTAL ART IN STONE, *illustrated*	276
THE SACRED MANGER CUT IN SOLID ROCK	277
STONE FOR FINE RESIDENCES, *illustrated*	277
HARDNESS AND STRENGTH OF STONE	278
EDITORIALS:	
Building Trades and the War	280
TRANSPORTING A BIG BLOCK OF STONE	281
OUR GYPSUM PRODUCTION	281
MARBLE AND GRANITE	281
A STONE GARDEN SEAT, *illustrated*	282
LIMESTONE AND SANDSTONE	282
BUSINESS BREVITIES	283
CONSTRUCTION NOTES	284
ILLUSTRATIONS:	
Louis Geyler Company Building, Chicago	
Gateway of Ely College, Cambridge, Eng.	
Capital of St. Marks, Venice	

ALPHABETICAL LIST OF ADVERTISERS

	PAGE
Appalachian Marble Co.	258
Ardolino Brothers	252
Bacon, Earl C.	288
Barnum, George	262
Barr, Thaw & Fraser Co.	252
Bedford Steam Stone Works	252
Blum & Delbridge	252
Books for the Trade	292
Bowman & King Stone Co.	252
Bowling Green White Stone Co.	
Brodix & Malone	260
Brown, George & Co.	257
Buckeye Gray Sandstone	
Building Stone & Clay Products	
Cameron, A. S. Steam Pump Wks.	295
Carr & Ball	252
Carthage Marble & White Lime Co.	252
Chicago & Bloomington Stone Co.	252
Clark-Conroy & Co.	252
Cleveland Stone Co.	263
Consolidated Stone Co., The	253
Continental Car Co. of America	287
Craig Co., John J.	258
Dallett Co., Thos. H.	293
Dark Hollow Gray Limestone	
Empire Engineering Co., Inc.	296
Empire Stone Co.	252
Farrell Foundry & Machine Co.	283
Fairmont Gas Engine & Railway Motor Car Co.	287
Falt & Co., J. P.	256
Frenier & Son	288
Furst-Kerber Cut Stone Co.	255
Georgia Marble Co. The	261
Gray "Canyon" Sandstone	263
Gray Eagle Marble Co.	258
Gillies & Sons, James	252
Hanlein & Son, Henry	256
Harrison Supply Co.	291
Heinlein Cut Stone Co., John	252
Hoosier Cut Stone Co.	255
Indiana Limestone Quarrymen's Ass'n	250-251
Indiana Quarries Co., Inside back cover	
Ingersoll-Rand Co.	288
Laidlaw Dunn Gordon Plant	293
Lidgerwood Manufacturing Co.	291
Lincoln Iron Works	290
Manning, Maxwell & Moore, Inc.	288
Marble & Marble Workers	258
Marine, Arlando	252
McDermott Stone Co.	262
McLaren & Sons, James	254
McMillan & Son, W.	256
Mt. Nebo Marble Co.	260
Meyers Machine Co., Inc., Willard F.	286
Middlebury Marble Co.	260
Miller Co., David	252
Monahan Stone Company	252
Napolean Gray Marble Co.	266
Nash's Expeditious Measurer	288
National War Savings Day	265
New Albany Machine Mfg. Co.	283
North Carolina Granite Corporation	257
Ohio Quarries Co.	264
Patch, F. R., Mfg. Co., Inside back cover	
Phenix Marble Co.	266
Pollard Mfg Co., Ltd.	289
Quincy Column Turning Co.	262
Riverside Machinery Depot	296
Rockport Granite Co.	262
Roebling's Sons, John A.	293
Ross & Republic Marble Co.	258
Royal Marble Co.	258
"Silk of the Trade"	257
Shaw Electric Crane Co.	288
Shea & Donnelly Company	255
South Dover Marble Co.	Back cover
Spurr & Son, J. J.	254
Star Stone Co.	260
Steam Stone Cutter Co.	290
Struble Cut Stone Co., Henry	252
Sullivan Machinery Co.	287
Sutermeister Stone Co., A.	252
Sylvan Green Marble Co.	260
Tompkins-Kiel Marble Co.	259
Trow & Holden	292
Victoria Marble Co.	258
Winnesboro Granite Corp.	257
Worthington Pump & Mach'y Co.	293

BUYERS' DIRECTORY OF THE STONE TRADES, PAGE 294
CLASSIFIED ADVERTISEMENTS, PAGE 296

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STONE

VOLUME XXXIX MAY, 1918 No. 5

Getting Ready for Peace

IF the old proverb is true, "In time of peace prepare for war," the corollary naturally follows, "In time of war prepare for peace." At this time all lines of business are greatly affected, the stone trade in particular, because building activity has been interrupted and there is a general embargo on the transportation of all materials not directly needed in the conduct of war. This condition will not long be maintained. Business, as a rule, is prosperous in this country, and as soon as peace is declared it is certain that there will be a period of greater building activity than this country has ever known before. The only thing to do, therefore, is to conduct the stone industry in such a way that it will be prepared to take advantage of the demand that will arise with the conclusion of peace. If shipments cannot be made now, the thing to do is to put the quarries in such order that stone can be sent out without delay as soon as cars and transportation are available. Equipment should be in perfect order and all necessary beds of stone should be stripped and uncovered and ready for quarrying operations. There is plenty of opportunity now for overhauling apparatus in the entire plant and seeing that it is fit for its fullest capacity.

A very excellent campaign has been started in Wilkes-Barre, Pa., by architects, contractors and business men, who have formed the National Planning Bureau. This organization is urging business interests everywhere to prepare for the coming of peace by planning now the commercial buildings and housing accommodations that will be needed when conditions return to the normal. In its publicity work the bureau says: "There are no building plans—that is to say, no *drawings*—for future buildings, or very few. We have planned ahead our various departments of business, but have we not overlooked the work of the architect and other technical men as fundamentally essential factors in future buildings? We will have materials ready for the job—for lots of jobs—but have we not forgotten the *plans?* The planning and designing of buildings is as necessary to the demand for material as our hands and feet are to a healthy appetite. With an abundance of building material, labor, railroad facilities, good weather, a country booming with prosperity—a tremendous national and foreign demand—what are we going to do without plans? We shall be like a great army of hungry men, in the presence of food-a-plenty, bound hand and foot, and calling for help to a little group who shall be overwhelmed in their efforts to serve."

The bureau thinks this matter should be kept constantly before the business interests. It says: "Put it in your own words—emphasize the danger of delay. Tell the busy man that 'when he is going to build' is a matter of secondary importance. *What* he is going to build is the paramount issue—NOW! Show him that it takes time, care, thought, experience and skilled men, experts in the structural, mechanical, electrical and sanitary branches, decorators, routing engineers, men versed in modern business methods and equipment, transmission of power, and last, but not least, architectural design. Haste, through unpreparedness, means costly errors—things forgotten, or the 'cart before the horse,' commercial or architectural monstrosities, and monuments to incompetency and unpreparedness. We were unprepared for WAR, *let us be prepared for* PEACE."

An excellent attitude for the stone trade to take is indicated by the Indiana Limestone Quarrymen's Association. In a circular letter it calls attention to the fact that unquestionably the Federal Government will modify its emphatic opposition to all building construction not directly connected with war purposes. While this would not mean a general opening up all along the line, it should involve a considerably increased volume of activities. Then these suggestions are made:

"The conditions under which the Federal Government is likely to modify its embargo on building operations will probably be contingent on the employment of materials available locally. That is, construction at, for example, Pittsburgh, Pa., would meet with no opposition by the authorities if no great amount of transportation is involved. Transportation is the chief factor in the situation now militating against the oppor-

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tunities of Indiana limestone in its country-wide markets.

"Our thought on the subject is that the operator members should weigh carefully the desirability of a policy seeking to place stocks of blocks or standard size sawed stone wherever conditions make it practical and feasible to do so. It is not our province to offer definite suggestions, since just how such a thing would have to be done necessarily lies within the judgment of the individual. We do want to venture the statement, however, that stocks of blocks and standard size sawed stone may well be placed particularly in those communities where present and prospective general activities are at high tide, where war contracts of every description are resulting in greatly increased population and business. We should say that in cases it would prove profitable to place stocks of the kind mentioned, even though some consignment arrangement would be involved.

"It is our thought that in moving material as suggested hereinbefore, it be done on the basis of orders or instructions taken conditional on ability to ship. Shipper then to hold such orders open ready for immediate forwarding the moment cancelled embargoes and availability of cars permit. The embargo and car situation should improve steadily henceforward."

The Quarrying of Marble

The average newspaper account of methods of quarrying and working stone is generally more noted for imaginative touches than for accuracy. A recent writer in a Troy journal, however, seems to have a pretty clear idea of the process. He says:

Be it simply for the quarrying of trap rock, or for the extraction of the finer grades of building stone from the sides of the quarry pit, there you will usually find explosives regarded as a necessity for lossening the stone and getting it in portable form for cutting and polishing in the quarry sheds. It is a surprising fact, however, that in one of the largest quarries in the world where only the highest grade of marble is obtained the stone is taken from the earth, transported about the vast quarry of 25,000 acres, cut up, polished and put into shipping cases all by electricity. Never a single "shot" is fired. Never a stick of dynamite is used in the course of the average day's work.

This "quiet blasting," if such it might be called, is extremely simple. It consists simply in cutting the marble up into blocks with electric-pneumatic channeling machines. These machines run on tracks and in operation cut deep grooves into the bed of marble. When the channeling machines are through the marble slab resembles a large cake of ice marked off for sawing. Then electric drills bore a line of holes along the mark of natural cleavage. All that remains to be done is for the workmen to drive a series of wedges into the holes. The wedges cause a rift to form in the stone and it splits off into blocks roughly the same size as the dimensions marked off by the channeler. An electric hoist next lifts the stone to a waiting flat car and it is whirled off to the finishing shed, where the marble block is cut up by an electrically-driven gang saw, and sent out to all parts of the country as finished building stone.

The quarry in which this system of getting out stone is used is situated near Proctor, Vt. Starting from a few small marble workings operated by steam the company has prospered until it now employs 4,000 men, and occupies a total area of 25,000 acres. Today steam has been discarded and in its stead there are 570 electric motors with a total aggregate horse power of 14,000. The smallest motor units are of only a few horse power, and from these they vary in size up to the most powerful motors with 250 horse power. All of the electric power used on the workings comes miles overland through a high tension transmission line. The power is generated by four hydro-electric generating stations, backed up by two steam generating plants usually held in reserve.

A New Government Building at Ottawa

The Canadian Department of Public Works have called for tenders for the erection of an office building for the Dominion Government to be erected at Ottawa on the corner of Queen and O'Connor Streets. The building will be 200 feet by 100 feet, nine stories and basement and have about 700 rooms. It is estimated that the cost will be $1,500,000. The footings and basement walls will be of concrete thoroughly waterproofed. The skeleton will be of structural steel wrapped with wire mesh and encased in concrete. The external walls will be of terra cotta and the outside masonry will be gray granite, tooled six teeth to the inch, up to and including the plinth. The balance of the masonry will be of a gray or buff brick with a lime or sandstone trim selected by the architects.

The floors to the corridors and stair landings will be of 1¼ inch terrazzo. The offices will be covered with battleship linoleum cemented to the floor and nailed to bevel strips set in the floor at the openings. The main entrance floors will be treated with Canadian quarried marble and have a wainscoting and dado of the same material.

Building in Italy

Building operations for the civilian population in Italy, says an exchange, have almost everywhere been suspended, owing to the high cost of building material (the manufactories of which are almost all closed down because of the fuel problem), the call to arms or to munition factories of labor hitherto therein employed, and the diminishing need of new buildings, which may be attributed to the absence of the male population and of foreigners.

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Indiana Oolitic Limestone in 1917

THE total value of Indiana oolitic limestone sold in 1917 was $3,384,110, a decrease of $96,415, or nearly 3 per cent, compared with 1915, according to figures compiled under the direction of G. F. Loughlin, United States Geological Survey, in co-operation with the Indiana Limestone Quarrymen's Association. This value, however, was greater than that for any preceding year except 1912.

Almost the entire value in 1917, as in previous years, was represented by building stone. The total quantity of building stone sold in 1917 was 6,570,645 cubic feet, valued at $3,261,107, a decrease compared with 1916 of 23 per cent in quantity and nearly 4 per cent in value, the average price increasing from 40 to 50 cents a cubic foot. Rough blocks and rough sawed stone amounted to 4,806,850 cubic feet, valued at $1,631,297 in 1917, a decrease of about 18 per cent in quantity but an increase of 19 per cent in value, the price per cubic foot rising from 23 to 34 cents. Dressed or manufactured stone amounting to 1,763,795 cubic feet, valued at $1,629,810, decreased 34 per cent in quantity and nearly 20 per cent in value, the price per cubic foot increasing from 75 to 92 cents.

The report is accompanied by a table that differs from that heretofore published in the volume "Mineral Resources of the United States" in that it includes rough sawed stone with rough blocks, the figures for 1916 being readjusted on this basis. The prices per cubic foot for 1916 are therefore distinctly higher in this revised table, that for rough stone increasing from 21 to 23 cents and that for dressed stone from 59 to 75 cents. As the rough sawing of soft stone is merely equivalent to the splitting of large blocks of granite into smaller blocks and is only the first of several steps necessary to convert rough into finished stone, this revision more truthfully represents the condition of the industry. The value of Indiana oolitic limestone used for building has represented large percentages of the total value of limestone for building in the United States in recent years: 69 per cent in 1913, 69 per cent in 1914, 72 per cent in 1915, and 74 per cent in 1916. The percentages of the value of this limestone included in the total value of all kinds of building stone in the United States was 15 per cent in 1914, 19 per cent in 1915, and 23 per cent in 1916. These increasing percentages and the decrease in sales reported for 1917 indicate greater decreases in the total value both of all limestones and of all other kinds of stone sold for building in the United States in 1917, as may be surmised from the curtailment in building for all except war purposes. An estimated decrease of 30 per cent or more in total quantity and of 8 to 10 per cent in value will probably not prove excessive.

The quarry companies almost unanimously reported that business conditions were much poorer in 1917 than in 1916, especially in the last half of the year. A few companies reported decreases of 30 to 50 per cent in sales; and one company failed to show a profit for the first time in 17 years. Selling prices were advanced from 5 to 26 per cent, but cost of operation advanced much more, wages advancing about 20 per cent, fuel as much as 100 per cent, and different supplies from 10 to 300 per cent. Increase in thickness of over-burden also seriously affected the cost of quarrying. Mill

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operators who bought their rough stone reported similar decreases in sales and increase in costs of labor and supplies, including rough stone, but nearly all of them reported that their selling prices were no better than in 1916, and some even reported decreases. A few mills were closed awaiting revival of demand, and no new developments of consequence were reported.

The quantity and value of finished stone sold by mill operators in the Bedford-Bloomington district who buy their rough stock were reported for the first time for 1917, amounting to 1,471,101 cubic feet, valued at $1,788,405, or $1.22 a cubic foot. These figures include a small quantity of monumental stone reported by two companies. The total value of the combined quarry and milling industry in 1917 was $5,172,515 and was probably second only to the value of the combined granite quarrying and milling industry in the Barre district, Vermont, which in 1917 was $8,316,600.

Shipments by quarrying and milling companies to different States were made to 43 States and to Canada. The six States to which no shipments were reported were, with the exception of Vermont, in the far West, and none except Washington have a population much if any in excess of 500,000. The large shipments made by Indiana, the leading State, is due in part to duplication, stone that was sold by quarry companies to mill companies in the Bedford-Bloomington district being counted twice. Even after the total quantity shipped by milling companies is deducted, however, Indiana retains the lead by a large margin and is the only State making shipments whose total value exceeded $1,000,000. New York was second with $844,975, and Illinois a close third with $833,918. Pennsylvania was the only other State whose shipments exceeded $500,000 in value. States with values that exceeded $100,000 were, in order of rank, Ohio, Michigan, Wisconsin, Iowa, District of Columbia, Nebraska, and Missouri. Canada also exceeded this figure.

Crushed stone, mostly for road metal, came largely from the Mitchell limestone, which overlies the oolitic stone, and amounted in 1917 to 93,086 short tons, valued at $62,698, and fluxing stone amounted to 47,439 short tons, valued at $10,163. These, with smaller quantities of riprap and stone sold to sugar factories, glass factories, and for agricultural use, reached a total of 210,326 short tons, valued at $123,003, a decrease in quantity of 0.9 per cent but an increase in value of 41 per cent, the average price per ton rising from 41 to 58 cents.

Wages for Scotch Masons

At a recent meeting of the Dundee branch of the United Operative Masons' Association of Scotland there was a discussion of the agreement that had been concluded between the employers and the operatives' association engaged in the building trade in Scotland, as the result of a conference held in Glasgow in connection with the question of wages, writes Consul H. Albert Johnson, from Dundee. This meeting, after careful consideration of the question, adopted resolutions that, so far as wages are concerned, all previous agreements associated with the society shall be suspended for the period of the war, and, instead of an annual agreement as to wages, they shall be revised every four months. All negotiations on wage questions would be on a national basis and apply to all sections of the building trade.

The procedure would be to have a representative committee put forward a claim on behalf of the whole building trade before the commerce of production, and whatever increase was granted would apply to all alike. The agreement would also allow the society to raise the question of districts where the present pre-war rate was considered too low, or where in certain places the increase since the war began was considered too small.

A motion was approved under which the central committee of the association was vested with authority to act on its own initiative during the period of the war in negotiations pertaining to wages, and to offer suggestions as to the amount of increase to be put forward.

Building in Montreal

The first quarter of the year has not opened well for the Montreal building trade, judging by the civic permits, says a Canadian journal. Last month the total was $241,660, a decreas of $101,800, while the value for the three months was $434,815, a decrease of $561,105. More work, however, is coming out, but is not of much importance. While it looks as if there will be a little activity in the construction of schools and churches, at the moment the outlook for heavy construction is not satisfactory. Montreal contractors, so far, have not been entrusted with so many out-of-town contracts as was the case in the two previous years, but they are hoping that the government office at Ottawa will come their way. Some three or four bids from Montreal firms are in. Prices of building supplies are higher, due in some degree to increased transportation charges and wages. Building permits issued in Montreal in the month of March number 90, and are valued at $241,660, as compared with 105 permits, value $343,460, in March, 1917.

Building Picking Up in Vancouver

Building work in Vancouver, B. C., shows signs of picking up. Building Inspector McKenzie reports the issuing of 64 permits, valued at $79,170, during the month of March, as compared with 46, valued at $33,715, in the same month last year. For the first three months of the year the total is 153 permits, at a value of $181,480, wihle during the corresponding period in 1917 there were 119 permits issued, valued at $159,540.

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Indiana Limestone and the War

LAST month an account was given in these columns of a conference with government officials in Washington had by a committee representing the producers and manufacturers of Indiana limestone and various commercial interests of Bedford and Bloomington. The purpose was to impress upon the government the vital importance of a great industry that was menaced by the discouragement of building activity. On March 29, in the House of Representatives, Congressman Oscar E. Bland made an interesting speech on this subject. Mr. Bland said that the action of the government in refusing to let building contracts, and of the various banking institutions in discouraging loans and financial assistance for all building and other so-called "non-essential" projects, was working a great hardship to the district he represented. He gave figures to show the importance of the industry in Lawrence and Monroe counties, Indiana. Mr. Bland incorporated in his speech a table prepared by the Government Geological Department, showing the States and Territories into which the product of the quarries in this district has gone during the year 1917 and the value of such production. The total amount sold by the mills (who buy rough stone) was 1,408,036 cubic feet, valued at $1,751,758. The amount sold by the quarrymen (rough stone and stone milled by the quarrymen) was 6,757,609 cubic feet, valued at $3,324,992. Another table gave further particulars, showing that during the year 1917 there was a decrease in production but an increase in value over the year 1916. This condition was largely due to the increased cost of labor and machinery.

Then Congressman Bland said: "Picture, if you can, gentlemen, these forty-two mammoth mills and quarries, employing their thousands of men, dotting the beautiful hillsides of this great portion of the State so wonderfully blessed by nature! Picture the thousands of happy, contented homes, where, owing to steady employment at good wages, the head of the house was enabled to not only shelter, feed and clothe and educate his children, but to enjoy all the comforts and many of the luxuries of life, and incidentally to be able to buy Liberty Bonds and in a hundred ways contribute to the revenues of the Government that are required to finance this war. That was the condition in this prosperous community prior to the time that the production of stone, except in certain excepted lines, was declared as 'non-essential.' The business of these communities depended upon the pay rolls of the quarries and mills; the laborers built their homes in the building and loan, and I am glad to say that most of them own their own homes. A more thrifty, intelligent, industrious and patriotic class of men never lived than the stone quarrymen of this district. They met the first calls of this Government for war purposes heroically.

"Today 2,000 men, I am informed, have left this community, trying to find work, work no doubt that they are not suited for. Many of them have spent a lifetime in becoming efficient in this particular line of duty and it is difficult for them now to be torn away from their life-long pursuits and to become accustomed to new avocations of life. Probably not more than a thousand men are now employed in the stone business in this field. The quarries and mills are probably running 20 per cent. capacity. There are at least, I am informed, 2,000 idle men who refuse to leave their

CARVED MANTEL IN BUFF INDIANA LIMESTONE
Architect, Thomas Benjamin & Son; cut stone contractor, Fred H. Hirth, all of Grand Rapids, Mich.

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homes and families and go out into the world of uncertainty to start life anew. The loan associations must foreclose their mortgages, because they must pay the banks or the banks must fail; the merchant must discontinue credit to his customers who have always been able to pay. I am told that bread line and soup houses, if not there now, are only avoided by the splendid charity of public-spirited citizens.

"Some one in bitterness has said that it is apparently the intention of some men in charge of governmental affairs today to conscript capital by taxation and to conscript labor by starvation. I do not believe this statement; I do not think there is a man connected with this Government today who seriously entertains such views or would dare to even attempt to put them into practice. The high cost of living has been a terrible problem to the laboring man. I have studied his condition closely and I am one of those who rejoices today in the splendid patriotism and sacrifices of the toilers of the Nation. If you will give him a chance to make a living for himself and his family and 'keep the wolf from the door,' he will help you 'whip the Kaiser'; but frankly, I would fear the consequences if hunger was permitted to gnaw the vitals of the great laboring class who produce the wealth of this Nation.

"This stone in this district is for the most part quarried and milled by hydroelectric power. Very little fuel is required in this industry. The Government is now erecting a great many permanent buildings other than post office buildings. The manufacturers of imitation stone, terra cotta and brick have the ear of those in charge of Federal building operations. The terra cotta fellows seem to be the favorites. Terra cotta and imitation stone require the use of a great amount of fuel, since both products are baked in ovens. The Indiana limestone mills can produce building blocks or building bricks of uniform size quicker than any of those competitors can produce either of the other products. There can be no comparison in the durability of the material and but inconsequential difference in the price.

"The other day, in seeking relief for this distressed condition of the people of my district, I sought the help of Secretary McAdoo. He was patient and kind; he was, no doubt, astonished at the havoc the 'non-essential' propaganda was creating in this great industrial center. Mr. McAdoo expressed his deep regret for these conditions, re-expressed his faith in the soundness of the 'non-essential' principle, and at the same time expressed the hope that 'the poise of industry would be maintained'; and then he asked, 'What can I do to help them?' I replied that a modification of the declarations made was not only proper but absolutely essential. I do not contend that it is of first importance that jewelry shall be manufactured; that sporting goods be produced; that fancy luxuries be indulged in; or that building operations or credit essential to these luxury-making enterprises be encouraged; but I do take the position that hundreds of different building operations necessary and essential in peace times are likewise essential and important in time of war and that credit and money and labor so employed is not wasted, but, on the contrary, opens up an avenue for Federal taxation and strengthens the industrial life of the country, which I regard as essential to the winning of the war.

"Yesterday I called upon the director of housing, who will probably spend the money provided for in this bill. He is now building homes for employees at Trenton, N. J., and at Hog Island, Pa. He states that they are using brick, but that they will probably use limestone from this district for the door and window sills. Now, the manufacture of ordinary brick occasions the use of fuel in great quantities, while the quarrying and sawing of stone in this district is largely done by hydroelectric power.

"In the consideration of this problem it must be understood that a territory devoted to quarrying of limestone is not fitted for agriculture, and it is also true that, for the most part, the entire population of the cities of Bedford and Bloomington, which are the beautiful county seats of Lawrence and Monroe counties, respectively, and much of the surrounding community, is absolutely dependent upon the stone industry. An expert stonecutter or quarryman, as I am informed, is rarely fitted for any other pursuit. This makes the blow fall heavily upon this community. Brick terra cotta and artificial stone being manufactured products are not limited to any particular community. It certainly should be the aim of those in charge of building activities of the Government to use the product of this quarrying district where it is at all practicable and it is largely for the purpose of impressing this important fact upon the minds of you gentlemen and others to whom this information may go that I have spoken so much at length at this time.

"In addition to my efforts in the direction spoken of, I have walked many miles through the labyrinth of corridors and oak-desked war offices in the multitude of war-activity buildings in this District trying to induce the various War Department heads to locate some kind of war activity in this stricken district or to let a contract for the making of some kind of war materials to some of the enterprising people of this community, but I have discovered that most of the war activities have gone South and the war contracts have gone South or East.

"In desperation the owners of these large, idle mills, some of them nearly a thousand feet long and a hundred feet wide, equipped with derricks and cranes for moving heavy materials, have appealed to the Quartermaster General's Department and other departments for the privilege of leasing these mammoth sheds to the Government for storage purposes. I am not even hopeful that this will be done, and, in my opinion, whatever relief is to come to these people must come in

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the way of using Indiana limestone for Government building purposes and in the broadening of the policy of the Government with reference to a modification of its present attitude on 'non-essential' industries.

"I am conscious of the fact that the 'non-essential' propaganda effort, if it may be so styled, has not only affected the Indiana limestone district but has paralyzed the building trades of the whole Nation. I do not have at hand the figures as to the number of men out of employment in the United States at this time, when labor is reputed as being so scarce and so valuable and high priced, but I have heard an estimate of the number so unemployed and it is truly appalling.

"We are told that from actual experience abroad it has been ascertained that it requires seven persons in industry to support one soldier at the front. In the case we have a United States military establishment of 3,000,000 men it would mean 21,000,000 men mobilized in our industrial army. What do you intend to do with those who are so unfortunate as not to be able to participate in war activities? Will it not eventually pauperize and bankrupt the Nation? Should it be our aim to run this war on money already earned, or should we have as a source of revenue supply a great, active industrial army of prosperous, busy people? England and Germany have not paralyzed their industries, but are permitting them to run at full blast with labor not required for war service, and then they tax these industries to the very limit, having regard only for the continued life and tax-paying ability of these institutions."

Blasting Stone by Electricity

At many large operations where considerable blasting is carried on to break down the material, it will be found that most of the blasting is done by means of electricity. In order to eliminate the human element as far as possible, the larger operations have adopted the use of "power circuits." This may consist of either direct or alternating current, although it is generally considered that for blasting purposes the former is the better. The wires are strung on poles around the quarry in such manner as to be easily accessible from the point where the blast is to be made. On various poles wires are run down from the main power line to a small box attached permanently to the pole. From these points the blasts are made. Two up-to-date and satisfactory methods used are as follows:

At the quarry of the Solvay Process Company, Sibley, Mich., a switchboard is used. This consists of a board to which is attached two wires with a plug, two 100-ampere fuse plugs, two binding posts to which the lead wires from the blast are attached, and a knife switch.

In making connections of the electric blasting cap wires to the lead wires, care is taken to see that the lead wires do not at any point come in contact with the ground so that there will be no chance of electric leakage at the connections. The electric blasting caps are connected to the lead wires either in parallel or parallel series, which is splendid practice where power circuit is used. After each electric blasting cap is loaded in the bore hole and again when all are connected to the lead wire, they are tested by the Du Pont Galvanometer to determine that everything is all right electrically. When all is ready, the lead wires are connected to the binding posts, the plug is inserted in the socket in the "shooting box," and then the blast is made by closing the switch. After the blast the plug is removed and the lead wires are disconnected. This makes a cheap but very efficient arrangement of making blasts and is one that is along the "Safety First" idea.

Another good method is one that is followed by the Michigan Limestone & Chemical Co., Rogers City, Mich. At this quarry they use a box, instead of a board, in which the switch is enclosed. This box is always closed and locked, when not in use, key being carried by the blaster.

Slab of Marble Delays a King's Funeral

Because a slab of marble needed to complete the mausoleum of the late King Alexander Adams, ruler of the gypsies of the country, failed to arrive in Oakland on schedule, approximately 1,500 nomads gathered from all parts of the country to vote on a successor, silently stole away again. They will be recalled when the slab arrives.

The normal population of the gypsies in California is estimated at 300 persons. The other 1,200 came from all parts of the Pacific coast, the Eastern and Middle Western States. Many of them came in gaudy covered vehicles drawn by horses, true pictures of the fortune telling gypsies on the roadside. A large proportion of them arrived in motor cars, many of these being of the latest model.

The election of a king was postponed. The gypsies learned the tomb of King Alexander could not be completed until a single missing slab of marble arrived from Italy. Until the tomb is finished the old king may not be buried, and until he is buried Romany must do without another king.

A Natural Safety Valve

A round, smooth hole in the side of a granite mountain about nine miles out from Mexico City is locally known by a term which signifies "Pluto's safety valve." The hole is about nine inches in diameter at the opening, which is polished in a manner which suggests human workmanship. That man had nothing to do with drilling or polishing this hole will be readily surmised when it is known that it has occasionally emitted hot air and smoke during a period extending 300 years.

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The Air Hammer and Health

FOR some time past the labor unions have been conducting a campaign against the use of the air hammer for stone cutting, particularly in the Indiana limestone belt. The men have claimed that the use of this tool has a bad and permanent effect upon the health of the operator, bringing functional disorders, nervous breakdowns and various other evils in its train. The employers, on the other hand, declared that there were no well authenticated instances of serious effects of the air hammer on the health, and pointed to the use of pneumatic riveters and chisels for many years in the metal and other trades without complaint from the men. The matter is one of great importance to the entire stone trade, but nothing is to be gained by a loose discussion between the advocates and opponents of the tool. What has been needed is a scientific investigation of the subject, and this is now furnished in a report by the United States Public Health Service, under date of March 22, 1918. A thorough examination of the effect of the tool on the workers in the Indiana limestone field was made by J. P. Lake, Passed Assistant Surgeon, and Dr. David L. Edsall, Consultant in Industrial Hygiene, both of the United States Public Health Service. Their findings are given in full in Volume 33, Number 12, of the Public Health Reports, issued by the Government Printing Office. This is very technical and is too full of medical terms to be quoted with any completeness in these columns, but their general conclusions are of interest and importance.

As to the manner in which the investigation was conducted, Dr. Edsall says:

"We requested Mr. Griggs, president of the Journeymen Stonecutters' Association of North America, the local officers of the stonecutters' association, and many of the men in both Bedford and Bloomington to bring to us those who complained most, or we got their addresses and went to their homes. None of the men that we examined were sent to us through the employers, and none were examined in the presence of the employers or their representatives. In Bedford we reached them chiefly in their homes. This had the advantage of making them and their households feel quite free to talk in regard to their condition. In Bloomington, Mr. Walters, the secretary of the local branch of the stonecutters' association, brought the men to us. In both places the men seemed extremely frank and open in what they said. They are, as a class, superior men in personality, education, and manner of living. It rapidly became apparent that because of the symptoms that I shall describe occur frequently, and fear had been aroused in various ways that they might grow worse, the anxiety of the men was due more to this fear of further and more serious results than to anything known to have occurred. In fact, several of those with the most pronounced manifestations said that if that was all, they thought it of comparatively slight consequence. Their fears of bad results had apparently been largely aroused within two years by their interpretation of the opinion of some physicians who had seen some affected men, but who, so far as we could learn, had not actually studied the cases or the men's work carefully, but had somewhat naturally based their advice upon the men's own apprehensions."

A very careful examination was made of nineteen men and Dr. Edsall says that the principal cause of complaint was a temporary blanching and numbness of the fingers when chilled. It occurs almost entirely when the weather is cold, and chiefly in the morning when the men start work and before they get "warmed up." It also tends to recur in cold weather when they are not working or when they plunge their hands in cold water. The condition was described by the men as "annoying," rather than serious. The numbness does not interfere appreciably with the use of their hands. Occasionally they state that it makes them clumsy, slower and less accurate in their work while it lasts.

The men sometimes complain of lameness in the arms, shoulders, or chest, says Dr. Edsall. Two said they slept badly and twitched and turned in their sleep after working hard with the hammer. These two, however, were in poor general condition. Various other symptoms of vague character and significance were elicited in some of the men. I may, however, for brevity's sake state here that neither questioning the men nor careful physical examination showed evidence that the symptoms mentioned or any others outside those in the hands were of any particular significance. They were rather such symptoms as some members of any group of men will always show when doing work, of whatever kind, that is at times hard work and often carried out in constrained positions.

Some excitement had been caused by the fact that one stonecutter had died insane. This case the men themselves now dismiss, however, as having been due to general paresis. One man we saw had had an ordinary acute facial paralysis. Quite naturally, in the apprehension that had been aroused, such occurrences and various vague rumors and suggestions had led to fears of "paralysis," Raynaud's disease, and a variety of other grave results. We could find absolutely nothing to justify such fears, even in the stories we were told. It is entirely conceivable that a neurotic subject might grow decidedly neurasthenic from dwelling on

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the disagreeable sensation that these small pneumatic hammers produce. Some of the men said that the sensation was exceedingly disagreeable to them at first, but all except the nervously over-sensitive soon get so accustomed to it that they pay no attention to it. It is in this respect like many other accompaniments of industry, as for instance the noise in many forms of work.

No muscular atrophy was observable. Five men stated that they had earlier had the trouble decidedly, but that it had gradually lessened until it had almost entirely disappeared. They attribute this to having learned to use the tool with greater skill and especially with an easier and less cramped grip. Other experienced workmen told me the older and more skillful men have less bother than the younger and less skilled and attributed this to the same cause and to the fact that the young men use the mallet little in "roughing out," while the older have more familiarity with the mallet and use it a good deal. Mr. Griggs stated also that it is more common in the young men than in the older. He believed this due to the more common use recently of the larger hammer, but the older men state that they use the larger hammers as much as do the younger.

Dr. Edsall says that there are three chief factors that evidently may play a part in producing the symptoms: Cold, constriction, and vibration. He is inclined to believe that the cold elicits the symptoms, rather than produces them. He makes these recommendations:

"It is obvious that certain simple things may be done to attempt to eliminate the trouble. First of all, the shank of the tool, where it is held, could be made larger, so that the grip need not be so strained. In doing this it would be well to use some substance that would conduct cold or heat poorly, instead of, as at present, intensifying the effect of cold by holding the cold metal. Asbestos suggests itself, and its practicability could be tried. Some of the men have tried rubber hose drawn over the tool, but said it tended to work upward on the tool and choke the action of the hammer. One man, however, said that he soaked the hose in oil, drew it on his tools, and allowed the softened rubber to adhere to the tool in drying and thereby was able to use it successfully. He said that he had earlier had 'dead fingers' but is no longer troubled by them. Asbestos, if practical, would have evident advantages. Some such handle would perhaps serve also to some extent as a shock absorber and thus reduce the possible effects of vibration. It is possible, too, that practicable methods of keeping the tools warm in cold weather could be easily devised and would reduce the discomfort. It is also to be noted that the practice of controlling the exhaust with the thumb or fingers of the right hand should be discontinued. In the same connection it is to be observed that in some hammers, due either to their construction or to wear, the exhaust leaks out downward along the tool—which it should not do—giving a slight constant blast of cold air on the left hand. This should be obviated. Heating the compressed air has, I believe, been tried, but meets with difficulties, and I do not believe it would be of much value if successfully done.

"Reducing the time spent at any disadvantageous work and shifting to other forms of work is in many kinds of industrial disorders sufficient largely to overcome the trouble. In this instance there is an obvious way of accomplishing this—by requiring the men to use the mallet in suitable parts of the work, especially in 'roughing out.' The operators say they have always preferred that this should be done, especially because compressed air is expensive, but that the men will not do it. The men admit they use the hammer in such work when they do not need to, partly because

A Simple But Dignified Indiana Limestone Mantel
Architect Thomas Benjamin & Son, Grand Rapids. Cut in Buff Indiana Limestone by Fred H. Hirth, Grand Rapids

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they get more done, but they say that unless they do the foremen look unfavorably upon them and are likely to drop them because they do not work so fast. Evident adjustments and understandings are needed on both sides here. Both the men and the operators and their foremen should recognize that the frequent shift to the mallet may go far to obviate the trouble."

Dr. Leake's conclusions agree thoroughly with those of Dr. Edsall, and his suggestions for remedying the trouble are along the same line. Dr. Leake also made an investigation of the pulmonary hazard among the stonecutters in the district. He says: "It appears that while Bedford has a proportional death percentage from phthisis slightly above normal, it has been no higher for stoneworkers than for other classes of the population, including females." The entire report should be read by all who are interested in the subject.

Repairing St. Paul's Cathedral

During the past few years much has been written of the settlement of London's most famous church, St. Paul's. Fears have been expressed that the foundations had been so weakened by the construction of the underground railway in the vicinity that the entire structure might collapse. Mr. Charles E. Sayer, in the course of an article in an English paper, states that happily it now seems clear that the foundations are not in fault, and that the root of the trouble is in the fabric itself. All new buildings settle more or less, according to their weight and the manner of their building, and St. Paul's, with its central dome weighing nearly 40,000 tons, has settled unevenly. The trouble is no new thing; serious defects showed themselves even in Wren's time, and he carried out extensive repairs in the crypt and elsewhere in 1710. In 1751 Flytcroft, surveyor to the fabric, reported, attributing the settlements to the rubble core of the piers and walls, and this, the earliest extant report, has been confirmed by recent discoveries. Things grew worse, and pieces of stone fell from time to time into the church, and in 1781 Mylne, then surveyor, was entrusted with the repairs, and the building was closed for eighteen months. Unfortunately, Mylne proceeded to conceal rather than to make good the defects.

The facing is of Portland stone, with joints about ¼ inch thick, and behind is the core of small rubble of Kentish rag, chalk, and five or six other kinds of stone, probably taken from the ruins of the old Cathedral, set with very thick joints of rather inferior mortar. It is evident that when the weight of nearly 5,000 tons on each pier was applied the mortar, being the softest part of the structure, would be compressed, and the core with four or five thick joints to one thin one of the facing would settle most, thus throwing an enormous strain on the Portland stone. This splendid stone stood the strain on the whole in a marvelous manner, but many stones were crushed and shivered, and the loud reports and falling pieces which would result must have been alarming. These facts are quite enough to account for the subsidences which have taken place, and there seems to be no evidence of any failure of the foundations. Under these circumstances the architect to the Dean and Chapter advised a thorough repair, beginning with the worst pier—that of the west side of the south transept arch.

As an instance of the thoroughness with which the problem has been treated it may be mentioned that at every critical point where any fresh movement in the building would be likely to show scientifically constructed gun-metal tell-tales, capable of being gauged and leveled to one-thousandth part of an inch, have been fixed. These are most carefully tested every week, and it is satisfactory to know that no measureable movement has been registered anywhere during the three years they have been in use. The question of further repairs is now under consideration, and it is earnestly to be hoped that money will be forthcoming to enable the Dean and Chapter to go forward with the work.

Limestone for Nitrate Plants

The rock crushing plant of the Foster Creighton Company at Rockwood, four miles south of Russellville, Ala., is the scene of much activity. The company has contracts with the government to furnish crushed rock at the nitrate plants in Sheffield and Florence until 1923, and the government has practically taken charge of the plant at Rockwood; $200,000 worth of new machinery has just arrived at the plant, and a swarm of men are now engaged in placing the machinery and building new houses for extra labor. When the plant is in full operation again it will be one of the largest of its kind in the south. The supply of rock is unlimited. The weekly pay roll of the plant, when production begins to full capacity, is expected to be in the neighborhood of $40,000.

A Peculiar Stone Found in the South

Staurolite is a curious mineral, or stone, found only in Virginia and North Carolina not very valuable but interesting on account of a legend that attaches to it. The name is from the Greek stauvos, a cross, the stone is found in the form of a cross, or sometimes a double cross. Another name for the stone is the "fairy stone," and this also relates to the legend that the fairies living in the caves of the mounains, on hearing the sad tidings of the death of Christ fashioned these crosses as mementoes of him. There has always been some commercial demand for the stones as curios and they are worn as watch charms or on chains with lockets.

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Making of Clay Products Restricted

MORE than once this magazine has called attention to the fact that the United States Government, since we have entered into the great war, has discouraged the class of building work in which natural stone would be the obvious material of construction. The reasons given for this course are to conserve our resources in the way of structural steel, fuel and transportation for our needs in carrying on the war. At the same time, in such building work as the government has undertaken it has made free use of brick, terra cotta and imitation stone. The logical answer to any such procedure, as we have already pointed out, is that the employment of natural stone would tend to the conservation of these resources far more than the use of the substitutes. Our quarries are well equipped, and need nothing in the way of additions to plant, whereas the manufactured articles require elaborate and extensive factories, kilns and mills, calling for constant repairs and replacements. There are also large stocks of stone on hand at the quarries which could be drawn upon without the necessity for much added labor. Many of the quarries, particularly in the Indiana limestone district, are operated by hydro-electric power and so use little coal, while brick, terra cotta and cement consume large quantities of fuel in the making. Stone is transported on flat cars and most artificial products in box cars, the latter being in great demand for the carrying of food and munitions of war. In buildings of ordinary size stone masonry can be erected without a structural framework, but terra cotta and artificial stone need steel and iron reinforcement.

It would seem as if this point of view had finally dawned upon the Government, for on April 17 the United States Fuel Administration issued regulations, approved by the War Industries Board, restricting the manufacture of clay products and rearranging and dividing the manufacturing programs of this industry in such a way as to place it on the basis of war industry. The products are arranged in ten classes, and the restrictions are as follows: On face brick, common brick, paving brick, terra cotta, roofing tile, floor and wall tile, and sanitary ware, 50 per cent.; hollow tile and drain tile and sewer pipe, 25 per cent., and stoneware (except chemical) 15 per cent.

The circular sent out by the Fuel Administration says: "Curtailment in each case is based on the average output of the past three years. It will be noted that the percentage of curtailment is not equal in all classes of clay products. These figures have been reached after careful investigation and represent rates of production which will be for the best interests of the necessary Government work and in general for the interests of the manufacturers involved.

"The experience of the last year has brought two facts clearly to the front: First, that as far as possible the new war work must be put into old factories to take the place of less essential production. This method of producing war supplies prevents building problems, housing problems, and transportation problems which necessarily follow the setting up of new plants for war production; second, that in addition to this transference it will be necessary for many industries to make deliberate sacrifices of a part of their ordinary business in order that there may be transportation, men, and materials enough for war production.

"The War Industries Board and the Fuel Administration have been for several months obtaining information which would enable them to reorganize lesser essential industries, such as building materials, which tax transportation facilities and fuel supplies to the largest extent. The Bureau of Standard and experts associated with each industry have placed their services at the disposal of the Government and have aided in reaching conclusions.

"In general the minimum basis of running for the year has been established in each class of clay products. This minimum has taken account of the more necessary requirements outside of strictly war activities as well as the necessities of the Government. Beyond this, it is arranged that whenever the Government departments certify requirements in any of the divisions exceeding the productive capacity of a given district on the minimum basis, such facts will be certified to the Fuel Administration and permits for additional running will be issued.

"The aim has been to conserve the larger interests of the trade involved. Equal treatment for all plants is provided wherever possible. Allowance, however, is made in the plan for recognizing individual instances where an abundance of fuel and absence of congestion make it desirable that a large proportion of production be permitted in a given district. The granting of such additional output has been hedged about with safeguards so that general conditions in the different trades will not be seriously affected."

The regulations of Fuel Administrator H. A. Garfield in regard to common building brick is as follows:

The term "common building brick" in this regulation shall be construed to cover all common building brick made by any process whatsoever. The term "manufacturer" in this regulation shall be construed to cover any person, firm, association or corporation engaged in the manufacture of common building brick.

No manufacturer, as defined above, shall, at any of his plants, consume, burn or use fuel of any description, including coal, coke, fuel oil, natural gas or other petroleum products, or use power derived from any such fuel, for or in connection with the manufacture of common building brick, as above defined, during the

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year beginning January 1, 1918, and ending December 31, 1918, to an amount in excess of fifty per cent. (50 per cent.) of the average annual amount of fuel consumed at such plant for or in connection with the manufacture of common building brick during the period from January 1, 1915, to December 31, 1917, excepting—

First: In case such plant was not in existence on January 1, 1915, then, and in such case, the period during which it has been in existence prior to January 1, 1918, shall be used as a basis in arriving at a determination as to the quantity that would constitute one-half of the average annual production.

(*a*) Upon evidence that the necessities of the Government in the particular district in which such manufacturer is located can not be supplied by plants within practical shipping distance of the place where the United States Government requires such product, unless permission is granted for such excess production, and that on this account it is necessary in the interest of the United States Government that such permit be issued.

(*b*) Upon receipt of certification from the Fuel Administrator of the State in which the plant is located that the material to be manufactured is to be used in connection with building operations of urgent public necessity and that the fuel used in manufacturing such material can be spared for such purpose.

Second: That whenever two or more manufacturers of common building brick shall find that a further fuel economy would result from combining the output of two or more plants, then and in such cases it shall be permissible, after receiving written permission from the Fuel Administration, for the several manufacturers to combine the aggregate allotment of fuel to the several plants, to be used jointly for the purposes of production, the manufactured products of such combined plants being distributed to the individual manufacturers as may be agreed between them.

In plants which manufactured common building brick exclusively during the years 1915, 1916 and 1917 manufacturers shall not consume, burn or use fuel to manufacture clay products other than common building brick without first presenting evidence that the manufacture of such other clay products is in the interest of the United States Government and receiving from the United States Fuel Administration permission in writing to manufacture such products.

It is ordered that on or before June 30, 1918, each manufacturer of common building brick shall report to the United States Fuel Administration the number of common building brick manufactured and the amount and kind of fuel consumed during the period from January 1, 1917, to December 31, 1917, and the amount of stock on hand December 31, 1917, and that thereafter semi-annual reports showing the number of common building brick produced, the amount and kind of fuel used, and the stock of brick on hand shall be made for the period from January 1, 1918, to June 30, 1918, and from July 1, 1918, to December 31, 1918. The report for the first period shall be made not later than August 1, 1918, and for the second period not later than February 1, 1919.

Any such manufacturer violating or refusing to conform to the above regulation will be liable to the penalty prescribed in the act of Congress. (Fine of not more than $5,000 or by imprisonment for not more than two years, or both.)

The term "terra cotta" is construed to cover all architectural terra cotta, whether glazed or unglazed, intended to be used for the interior or exterior construction or decoration of buildings, made by any process whatsoever.

Carthage Limestone and Marble

Missouri, which ranks second to Indiana in the production of limestone for building and which showed gains of 17 and 25 per cent, respectively, in value of output in 1915 and 1916, suffered a decrease in 1917, according to figures compiled under direction of G. F. Loughlin, United States Geological Survey, Department of the Interior. This decrease was due to decline in sales in the Carthage district, Jasper County, which has furnished 65 to 75 per cent of the limestone for building sold in the State in recent years. The decrease, which was caused by curtailment of building operations due to the war, began in the spring of the year and has since reached a point where erection of permanent high-grade buildings by private interests is now practically at a standstill. Selling prices increased slightly in 1917 but were not sufficient to offset the increased cost of production.

The total value of the limestone and marble sold in the Carthage district in 1917 was $392,443, representing a decrease of 28 per cent compared with 1916 and of 5 per cent compared with 1915 but exceeding the total of any other year. The output of building stone, the principal product, amounted in 1917 to 313,904 cubic feet, valued at $302,411, a decrease of 36 per cent in quantity and 39 per cent in value compared with 1916. The quantity of building stone sold in 1917 was less than in any of the nine preceding years except 1914; the value in 1917, however, was exceeded in only four years, 1909, 1910, 1915, and 1916.

Of the total quantity of building stone sold in 1917, 219,940 cubic feet, valued at $160,350, was rough, and 93,964 cubic feet, valued at $142,061, was dressed or manufactured stone. The proportion of stone dressed by the producers increased greatly in 1915 and 1916, owing largely to the quantity required for the new State Capitol of Missouri. The proportion of dressed stone sold in 1917, though less than in the two preceding years, was greater than in earlier years.

The production of monumental stone in 1917 amounted to 49,819 cubic feet, valued at $58,809, an increase of 97 per cent in quantity and 167 per cent in

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value compared with 1916, the first year in which figures for monumental stone were separately recorded. This increase was in keeping with the conditions of the monumental-stone trade throughout the country and reflected the continuation of the prosperity for a large part of the country which was so conspicuous in 1916. All the monumental stone was sold rough by the producers.

Of the minor products of the Carthage quarries in 1917, flagging amounted to 8,228 square feet, valued at $1,387, a decrease of 18 per cent, and rubble to 1,139 short tons, valued at $1,030, a decrease of 61 per cent. Stone for sugar factories, amounting to 3,169 short tons, valued at $1,491, is included under "Other stone," and other important items under this heading are stone for glass factories, fluxing stone, crushed stone for concrete, and pulverized stone for agriculture. The total value of these products, valued at $31,223 in 1917, increased 56 per cent as compared with 1916.

High Prices for Antique Sculptures

During the past month there has been exhibited in New York and dispersed at auction one of the most remarkable collections of Italian antiques ever brought to this country. This collection was made by Stefano Bardini, and included a number of marble sculptures and terra cotta and colored stucco bas reliefs by the greatest of artists. The prices in many instances made a new record in this line. A fifteenth century glassed terra cotta bas relief by Andrea Della Robbia brought $11,600, and a colored stucco bas relief by Antonio Rossellino sold for $7,600. Various other reliefs in terra cotta and colored stucco by such masters of the Renaissance as the Della Robbias, Donatello, Sperandio, and the like, brought prices ranging from $2,100 to $6,900. A pair of eighteenth century marble flower holders went for $5,900, and a fifteenth century Florentine marble bas relief by Bernardo Rosselino for $6,300. A Parian marble torso of a youthful athlete by Polykleitos of Sicyon, a Greek sculptor of the fifth century B. C., sold for $5,400. The sale emphasized the fact once more than New York is at present the foremost art market in the world.

Distilling Oil from Shale Rocks

In its investigations of richly carbonaceous shales in the United States, made to obtain information concerning shales that may be profitably distilled for their content of petroleum when the oil fields of the country have been more fully exhausted or the prices of crude oil have become higher, the United States Geological Survey has sampled and tested some shales from deposits of unusual interest in Montana. These deposits are not very thick, and their yield of oil is not greater than that of shales now distilled for petroleum in Scotland, but they are somewhat unusual in that the shale contains a considerable amount of phosphate as well as the bituminous matter that is convertible into petroleum. A sample of this shale from Muddy Creek basin yielded 7.5 gallons of petroleum per ton of shale and 15.56 per cent. of phosphate, and a sample from Smallhorn Canyon yielded 24 gallons of petroleum per ton of shale and 2.62 per cent. of phosphate.

Feldspar Quarries in Ontario

Both potash and soda feldspars are found in the Kingston district, the former containing 10 to 12 per cent of potash and the latter as high as 10 per cent of soda, writes Consul Felix S. S. Johnson from Kingston, Ont. Prevailing prices are from $4 to $4.50 per net ton f. o. b. Canadian shipping point. The best time to purchase feldspar is in the winter season, as shorter hauls can be made then over frozen streams and marshes that are impassable in the summer; also, during the winter months more teams are available, as the farmers are not using their horses for field work.

There are at this writing two large grinding plants near Rochester, N. Y., importing feldspar from the Kingston district, and the prospects are that more ginding plants will be built near the border in the near future. The circumstance that the crude stone pays no duty upon entering the United States and the ground spar pays a duty of 20 per cent accounts for the location of the grinding plants in the United States. A cheap rate could be obtained by having the feldspar sent to Kingston by rail, then by water to Oswego. As coal barges from the latter place return in ballast, a low rate could thus be had. The value of feldspar exported from this consular district to the United States in 1917 amounted to more than $100,000; this year's contracts will probably exceed $300,000.

Increased Production of Abrasives

Tremendous expansion in manufacturing in 1917, particularly in the steel and metal industries, is reflected by the increased production of high-grade abrasive materials in the United States. A preliminary compilation by Frank J. Katz, United States Geological Survey, of reports on the production of emery, corundum and artificial abrasives in 1917 indicates a total of 72,276 short tons, valued at $8,325,312, which is an increase of 33 per cent. in quantity and 172 per cent. in value as compared with 1916.

The production of emery from the Peekskill district, N. Y., amounted to 14,842 short tons, very little less than in 1916; the production of corundum in North Carolina was 820 short tons, a large increase over 1916; and the production of crude artificial abrasive materials in the United States and Canada, which are largely prepared for use in the United States, amounted to 57,614 short tons, which was 48 per cent. more than the production in 1916.

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STONE

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VOL. XXXIX MAY, 1918 No. 5

ACCORDING to newspaper reports, the masonic fraternity has just dedicated a new temple in Lancaster, Pa. The description of the building says that it is trimmed with imitation stone. To one who is not a member of the fraternity, this would seem to call for some explanation. The traditional founder of the order was Hiram, King of Tyre, who was called to aid Solomon in the uprearing of the Temple. This master craftsman wrought, not in any sham materials, but in gold and silver, copper and brass, the noble cedars of Lebanon and honest limestone from quarries that can still be traced in Jerusalem. The entire order is symbolical of stone masonry and its ritual is couched in terms of the craft. Some masonic lodges, in their enthusiasm, have gone to the expense and trouble of bringing blocks of stone from these identical quarries in Jerusalem to serve as their altars. Does it not seem a bit of mockery for masonic ceremonials to be conducted in a temple made of imitation stone? "Plumb, level, square"; can it be all of these, and yet a mere sham?

THE report of the New York State Department of Labor for the month of March shows that the stone, clay and glass products group, comprising in the main those materials used in building and construction work has been declining steadily since last May. March showed some improvement over February, but had 14 per cent less employees than March, 1917. The building departments of the ten first- and second-class cities reported, for March, 1918, that every one of these cities, except Yonkers, issued less permits for building construction than for the corresponding month of 1917. This decrease in the estimated cost of work to be done was 61 per cent for all these cities combined, with Schenectady as lowest at 15 per cent less and Binghamton as highest at 73 per cent less. New York City reported a decrease of 63 per cent, to which each borough contributed. On the other hand, there was a 24 per cent increase for March, 1918, as compared with Feebruary, 1918. Albany was the only city which showed a loss for that period. Although New York City increased by 21 per cent from February to March, Manhattan Borough reported a slump of 42 per cent.

WAR conditions have seriously affected many lines of business, and readjustments are found necessary in almost all trades. A very sensible note of warning is sounded by Roger W. Babson, who says: "Some concerns have become demoralized by the industrial upheavals caused by the war and are deserting their normal trade or even going out of business altogether. We have continually pointed out various practicable methods of readjustment, but we caution clients not to throw away their enterprises in a panic. With a continuation of the war for several years longer, which is entirely possible, conditions in many lines will become even more arduous; but the concern which has the courage and strength to hold on will win a position of advantage well worth the struggle. The outlook is that transportation will be the chief difficulty. This is now the limiting industrial factor and will remain the chief cause of scarcity of materials and merchandise." There is no need for hysteria. The country has never been as prosperous as at present, and it can see this war through, no matter how long or costly it may be, without sacrifice of its commercial supremacy. When the end finally comes there will be such a boom in our business as the country has never known before, and we must be ready to take advantage of our opportunities.

AS THE war progresses there is a steadily growing restriction of articles that may be imported from foreign countries. The War Trade Board announces that no import licenses for shipments made after May 13, 1918, will be granted for certain articles, except as specifically provided. Licenses for lime, talc and soapstone will be granted only for shipments coming from Canada, and for cement for building purposes and for stone and manufactures thereof only for shipments coming overland or by lake from Canada or coming overland from Mexico. It is explained that these provisions authorize the importation of the specified articles only when the goods originate in one of the countries designated in the particular provision covering such article, and do not permit the importation of goods originating in other countries, but coming through such designated countries. The interpretations prepared by the Bureau of Imports contain the following as to stone and manufactures thereof: "All articles specified in or classified under paragraphs 97 and 99:

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also all articles specified in or classified under paragraph 98, except articles composed wholly or in chief value of agate, rock crystal, or other semi-precious stones as specified therein; also building stones in forms, classifiable under paragraphs 81 and 549; also freestone, granite, sandstone and limestone specified in or classified under paragraph 614 and stone sweepings classified under paragraph 614."

GOVERNMENT reports declare that this country is suffering from a shortage of clay, due to the monopolizing of our ocean-going ships for war purposes. A large part of the high grade clay used in this country comes from England, and besides the cargo space it uses, another drawback to its importation is the fact that it requires considerable time for loading. This country contains very extensive clay deposits, and much of it is of excellent quality. There would seem to be an especially favorable opportunity just at present to develop another native resource. But the government sounds one note of warning. It says: "Domestic producers do not mine their clay quite as cleanly as their English competitors. Nor is the domestic clay as uniform in character. It will not bring the high prices paid for English clay. But more could be sold if it could be produced and carried to its market. Still more could be marketed if cleaner, more uniform, clay were produced, for in that event the consumers would use a greater percentage of domestic and correspondingly less English clay in their mixtures." Fortunately, it is a fact that far less English clay is necessary to proper manufacture of paper than is now used. Besides domestic clay there are many other substances of domestic origin that could be used in the body, not the finish, of this paper. Also over half of the English clay we use is consumed in making paper. So that if a shortage of English clay should develop it would not be highly serious until the shortage became very great, until there was only a half of the normal supply or less available.

IN a recent address before the Americanization Conference in Washington, Secretary Franklin K. Lane said: "Now there are several things which we have come upon recently which seem to those of us who have not been wise to be discoveries. The first is that we have a great body of our own people, five and a half millions, who cannot read or write the language of this country. That language is English. And these are not all of foreign birth. A million and a half are native born. The second is that we are drafting into our army men who cannot understand the orders that are given them to read. The third is that our man power is deficient because our education is deficient. The fourth is that we ourselves have failed to see America through the eyes of those who have come to us. We have failed to realize why it was that they came here and what they sought. We have failed to understand their definition of liberty." In the stone industry many aliens are employed who do not understand or speak the English language. Quarrying is classed as one of the hazardous occupations, and the ability to comprehend commands in the vernacular is essential to safety. It is up to the employers to see that this condition of affairs is remedied as rapidly as possible, and that a large majority of their men can understand the language. Many employers have found the knowledge of English such a valuable addition to the worker's efficiency that increased pay or promotion are given to those who learn the language. Other firms have classes in the plant on company time, and regard this measure as business efficiency, not as philanthropy. Instruction in the duties of citizenship should go hand in hand with the teaching of English. The advantages of becoming naturalized should be brought home to the alien, and he should be encouraged to take out first papers and should be taught the legal forms for securing final papers.

Building Operations in Leading Cities

The Government has been compiling statistics of building operations in some of the leading cities for 1916. Efforts were made to obtain detailed information from 153 cities, but the figures were fairly complete for only 129 cities. The figures show that on the whole the building industry was in more prosperous condition than in 1915, though six cities that showed increase in 1915 showed decrease in 1916. The most noteworthy features of the building industry in 1916 were the large increase in the cost of building operations in the Borough of Manhattan ($60,405,370) and other large cities and the general increase in the average cost per permit or building.

Various causes are assigned for these changes. In many cities the increase in the building operations is ascribed to the general prosperity. In the Borough of Manhattan, New York, the great increase is ascribed by the superintendent of buildings to the passage of an ordinance restricting the use, height and area of buildings by zones. In anticipation of this ordinance many plans were filed to escape its provisions. Manhattan showed the largest increase, but the Bronx and Brooklyn showed decrease. No report was received from the Borough of Queens. Boston showed the second largest increase. Much of this large increase may be more apparent than real, as the method of recording building statistics in Boston was changed in 1916 and credit was given to that year for a large amount of building which might have been credited to 1915.

Forty-nine of the cities given in the first table showed increase, and nine showed decrease in the total cost of building operations. Twenty-five cities that showed decrease in 1915 rallied and showed increase in 1916, 24 showed increase in both years, and only

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3 cities showed decrease in both years, the net increase being $196,127,904, or more than 28 per cent. The largest proportionate increase was in Chester, Pa.—304 per cent. The largest decrease was in Cincinnati—$2,600,519, or 19 per cent.—though if the Bronx is considered as a separate city it showed the largest decrease—$10,926,066—and also the largest proportionate decrease, 37 per cent.

The cost of building operations in these cities in 1916 ranged from $3,086,871 in Houston to $199,232,176 in Greater New York, the average for these 58 cities being $15,281,633.

The total number of permits or buildings increased 37,163 in 1916. They ranged from 591 in Sioux City, Iowa, to 26,585 in Greater New York. The average cost per operation in these 58 cities was $3,421 in 1916 and $3,110 in 1915. In Greater New York the average cost was $7,494 in 1916 and $5,948 in 1915; in the Borough of the Bronx it was $4,997 in 1916 and $7,360 in 1915; in Brooklyn it was $2,563 and $3,142 in 1915; in Manhattan it was $30,143 and $19,773, and in the Borough of Richmond it was $2,281 in 1916 and $897 in 1915. In Chicago, the second city in the cost of building operations, the average cost was $10,979 in 1916 and $9,409 in 1915; in Detroit, the third city, it was $3,097 in 1916 and $3,595 in 1915; in Philadelphia, the fourth city, it was $3,598 in 1916 and $2,522 in 1915; and in Boston, the fifth city, it was $5,440 in 1916 and $4,601 in 1915.

Stone Houses in Italy

Beds of excellent clay suitable for brick and tile making, good building stone, and limestone capable of yielding fine qualities of lime and cement are to be found in almost every part of Italy, writes Consul F. T. F. Dumont, from Florence. Centuries of scarcity of lumber have developed methods of construction in which a minimum of lumber is used. A surplus of labor has kept wages at a point that makes stone and brick construction possible at prices that would seem incredibly low in new countries. Good modern houses are built almost entirely of stone, brick, and plaster. Stone is used for foundations, walls and partitions and brick for finishing door and window openings and topping walls where suitable stone can not be found, while plaster is applied directly to the exterior and interior walls for finishing purposes. Floors are composed of light iron I beams, suitably spaced, between which a flat arch of hollow tiles is laid, the top of the arch being slightly below the top of the beam while the bottom projects below the bottom of the beam. The floor is either cement sufficiently deep to give a uniform surface, which is painted, or else a cement base in which tiles can be laid. Interior walls are kalsomined. Moldings, baseboards, cornices, steps, etc., are done in stone or cement, as are door and window sills. All interior ornamentations are in plaster of paris or cement. Roofs are flat and tiled like floors. Ceiling plaster is applied directly to the arch tiling. New buildings usually conform in style to those erected in former centuries. Only doors and window frames and shutters are of wood.

Denver's Civic Center

Denver acquired for a civic center nine acres of valuable ground in the heart of the city, opposite the capitol buildings, nearly a decade ago. Upon the proper beautification of the tract experts have differed; and the result has been that the tract was not consistently improved. Work begun last year under Mayor Speer, however, is expected to be finished before the close of 1918, and to leave the center complete. It will contain an open-air Greek theatre seating 5,000 people, partly done in marble and granite. There are to be gardens, lagoons, statuary and balustrades, the whole costing over $2,000,000 in addition to donations from citizens. Two residents of Denver have given two bronze figures—a bucking broncho and an Indian scout—by the Western sculptor, Proctor; and another has contributed an ornamental gateway costing $100,000.

Notes from the Stone Fields

MARBLE AND GRANITE

The Herter & Leins Monument Company, of Marshalltown, Ia., has made additions to its plant that will virtually double its capacity in order to take care of its constantly increasing business.

The contract for wainscoting and marble work on the third floor of the city hall at New Haven, Conn., has been awarded to A. U. Sasso, of that city.

The largest shipment of granite ever sent from Vermont went out on the Montpelier and Wells River Railroad in the two weeks starting March 13. Two hundred freight cars loaded to their capactiy containing more than 6,400 tons of finished product went out of Vermont. The value of the product was more than $1,500,000.

The docks of the Vermont Marble Company, at Tacoma, Wash., have been taken over by the Seaborn shipyards for the rigging and outfitting of the first of their standard type vessels built for the United States Emergency Fleet Corporation.

Richmond, Va., will soon begin expending a large sum of money for street improvements, including granite paving and curbing.

Adilio Nativi, aged twenty-one years, a granite cutter of Barre, Vt., was instantly killed recently, when a ten-ton block of granite n which he was chiseling became unsettled from its base and toppled over to the ground. The man saw the great stone start to topple and jumped, but was not quick enough, the stone crushing him to death.

Among recent acquisitions at the Metropolitan Museum of Art, New York, is a sculpture of Vishnu from a temple in Kikkeri, in the Mysore district of India. The work is supposed to have been executed in the twelfth century.

Property holders in Atlanta, Ga., are agitating in favor of using granite curbing when the streets are repaved. The board of public works will lay the curbing without cost if it is furnished by the property owners. A member of the committee having the matter in charge calls attention to the fact

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that while ordinary rubble curbing will be laid by the County without extra cost under the present contract, the highway will be much more satisfactory, both in efficiency and sightliness, if granite curbing is used. Practically all of the property owners on the leading thoroughfare have signed the petition for granite curbing.

Granite contains nearly all food necessary for many plants. Therefore, freshly ground granite is a good fertilizer, says an exchange.

About 200 stone cutters and quarrymen at Lithonia, Ga., recently went out on a strike, the suspension of operations being due, it is said, to a dispute over the wage scale. It is declared that the men want an increase of 20 cents per day until May 1, and then another increase of 60 cents, making the total daily wage on that date $4.80. The present wage is $4 per day, it is understood. The quarry operators, it is stated, have offered a compromise, providing for an increase to $4.40 per day until July 1 and an increase at that time to $4.80. Negotiations are in progress.

LIMESTONE AND SANDSTONE

The Kingwood Stone Company has just been incorporated to operate the quarries at Kingwood, Preston County, W. Va., formerly owned by the Kingwood Quarries Company. The stone is a quartzite of antique yellow color, used in the Synod House of the Cathedral of St. John the Divine, the Potter chapel, the Russell Sage Memorial building, and other important structures in New York and vicinity. The new people who have taken over the enterprise represent banking interests at Morgantown, W. Va., which were large holders of the bonds of the defunct company.

The new 5-story addition to the Hospital of the Good Shepherd, in Syracuse, is in Indiana limestone, supplied by the Patten Cut Stone Company, of that city. The hospital is now one of the largest and most modern in the State.

Limestone for repairing the roads of Floyd County, Ind., will be obtained from the American Rubbing Stone Company's quarry north of New Albany, for which a contract has been made by the board of commissioners at 7 cents a cubic yard. It is estimated there will be three cars of stone taken from the seven-foot ledge at the quarry daily, and it will be crushed there by the County's machine and distributed from that point. Rock was purchased heretofore from along the Southern Railway, west of the city, and the traction company, east of New Albany, and by using the material nearer a saving in cost will result.

One of the largest moving picture theatres in Greater New York has just been completed at Bedford Avenue and Brevoort Place, Brooklyn. The exterior is of tapestry brick with limestone trimming.

A premature blast at the quarry of the Birdsboro Stone Company, at Monocacy, Pa., recently killed two of the workmen. It is supposed that one of the men dropped a stick of dynamite.

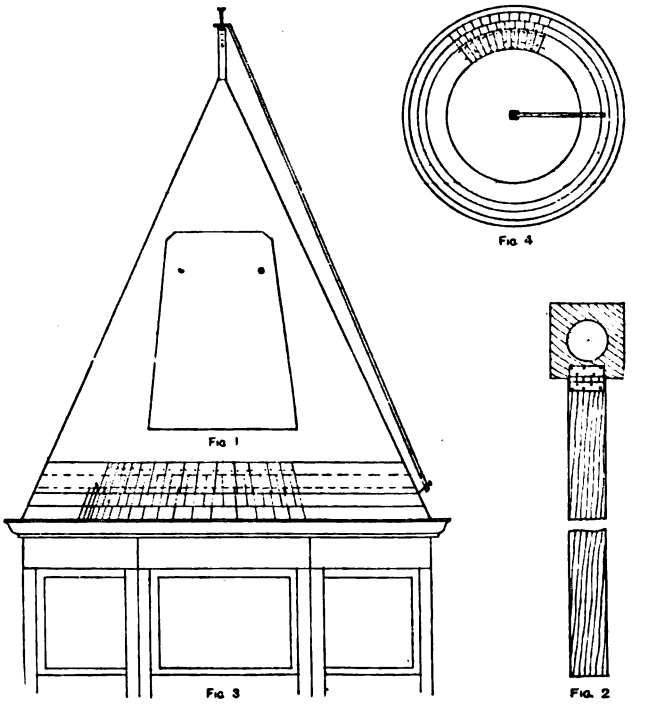
The annex to the Treasury Building, in Washington, will be erected in gray Indiana limestone.

Slating a Conical Tower

In this article it is proposed to show the methods of slating a conical tower with slates of irregular sizes. Two methods are open to the slater, namely, (1) By means of a trindle; (2) by striking a line on the slates when they are on the ground. The slates for a tower should be carefully selected, specially dressed (as shown in Fig. 1 to suit the style of roof, and carefully sized by means of the pin rule, says the *Building World*, of London.

The trindle (Fig. 2) is made with a piece of wood 4 in. square, a slater's lath, and a hinge. Bore a hole in the centre of the square piece of wood and fix the lath and the wood together with the hinge and screw nails. Care must be taken to invert the hinge so that the lath may be lifted up over any obstacle such as scaffolding. If there is no centre rod in the centre pole of the tower, an ordinary round chisel may be fixed in the centre pole, over which the trindle is slipped, so that it may run round with a fair degree of accuracy.

The lath of the trindle is usually made to suit first the full depth of the roof, and is gradually shortened as each course is put on, the piece being sawn off to suit the slater's gauge, which gives the amount of weather and also the amount of cover. Through this lath a nail is driven, and the trindle is



taken round the tower scratching a line on the course of slates already put on. Fig. 3 shows the elevation of the tower, and three courses of slates, with the trindle fixed and set to the line of the third course. Fig. 4 shows a reduced plan.

Method (2) is done by laying the slates on a flat plank, with the tails butting against another plank laid on edge against it. A set is marked by means of the gauge at each end of the row, and a chalk line struck through the sets. The slates are then carried to the roof and put on.

Business Brevities

Residents of Northeast Minneapolis, who object to operation of the Minnesota Crushed Stone Company's plant at 1500 Johnson Street northeast, were denied an injunction preventing operation of the crusher, by the district court. The case will come up for regular trial on May 18. Attempts have been made by residents of that section of the city to force action by the council, but the council so far has been unable to find a legal way in which to do so.

The stock of the Toledo, O., Mantel & Tile Company was damaged to the extent of $10,000 by fire recently.

The O'Brien Stone Company, of Bellefontaine, O., has increased its capital stock from $40,000 to $60,000.

A. P. Sandles, secretary of the Ohio Macadan Association, was elected executive secretary of the National Crushed Stone Association at a meeting held in Chicago recently.

The Conkey Sand & Gravel Company, of Oregon, Ill.,

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which bought out the Lerrke Company plant last year, has a force of men getting it in order to run. They have added much new machinery and equipment. They have plenty of market for all their output and expect a very busy season.

The Granite, Sand & Gravel Company, of Indianapolis, Ind., has increased its capital stock from $40,000 to $70,000.

The Union Stone Company, of Vincent, O., has increased its capital stock from $20,000 to $35,000.

The Nassau Sand & Gravel Company, of New York, has increased its capital stock from $10,000 to $200,000.

The Elmhurst Chicago Stone Company, of Elmhurst, Ill., has increased its capital stock from $75,000 to $125,000.

Quarry Notes

The H. B. Sproul Construction Company, which has a contract for road work, is erecting a crushing plant at the James Duell quarry in Glenville, Westchester County, N. Y. The stone will be taken from the crusher to the highways to be improved by automobile trucks.

Madison, Wis., has not yet opened the municipal quarry this year, but has purchased stone needed for highway improvement in the open market. The mayor will appoint a committee to investigate the cost of reopening the city quarry.

The stone quarry at Belgium, Ozaukie County, Wis., has begun operations for the season.

The Marquette Stone Company has decided to operate its quarry west of Marquette, Mich., and has a force of men at work. Repairs have been made to the crushing plant. The company will supply stone for road work in Marquette and throughout Green Bay County.

New Companies

The Wege-Stanford Marble & Tile Company, of Indianapolis, Ind., to manufacture and sell sawed and finished marble. Capital $5,000. Directors: G. C. Wege, A. D. Stanford, E. Stanford and O. Wege.

The Eastman Quarry Company, of Rutland, Vt., to quarry and deal in marble. Capital $100,000. Incorporators: Wallace C. Clement and Walter S. Fenton, of Rutland, and Henry G. Smith, of New York City. The company will employ 200 men.

The Lake Erie Sand Company, of Sandusky, O., to deal in sand, stone, etc. Capital $150,000. Incorporators: William Hendrickson, Alfred Hendrickson, Henry Gerhardstein, Louise Starbird and Louis Werner.

Raritan River Sand Company, of Millville, N. J., to deal in sand, stone, gravel, etc. Capital $25,000. Incorporators: Edwin S. Gleason, New Brunswick; D. E. Corbett, Matawan, and George S. Murray, Metuchen.

The Cook Stone Company, Hopkinsville, Ky., to do a general stone business. Capital $50,000. Incorporators: James O. Cook, J. T. Edmonds and Sam Frankel.

The Boston Crushed Stone Company, of Boston, Mass., to quarry and crush stone. Capital $10,000. Incorporators: Gertrude Hyan, Simon E. Duffin and John J. Graham, Boston.

Wissota Sand & Gravel Company, of Eau Claire, Wis., to deal in sand, stone, etc. Capital $30,000. Incorporators: Louis Arnold, Andrew Larson and Allard Rowe.

Ohio River Sand & Gravel Company, of Cincinnati, to deal in sand, stone, etc. Capital $50,000. Incorporators: C. J. McDiarmid, S. Galbraith, E. J. Burke, S. W. Lloyd and H. A. Lloyd.

The Little Falls Black Granite Company, of Little Falls, Minn., to quarry and deal in granite. Capital $75,000.

St. Lawrence River Granite Company, Inc., of Carthage, N. Y., to quary and deal in granite. Capital $25,000. Incorporators: H. B. Kelly, Clayton; E. C. Crooks and F. J. Crooks, Carthage.

Old Hickory Clay & Talc Company, of Paducah, Ky., to quarry talc, etc. Capital $25,000. Incorporators: C. E. Jennings and others.

Millville Stone & Lime Company, of Millville, Pa., to operate quarries and lime kilns in Pennsylvania and West Virginia. Capital stock $535,000. Incorporators: E. J. McKenna, W. H. Lemon, E. B. Strassburger, K. R. Connolly, of Pittsburgh, and E. R. Sullivan, of Crafton, Pa.

W. W. Ballantine Company, of Cleveland, O., to do a general stone business. Capital $25,000. Incorporators: W. W. Ballantine, R. A. Heiser, W. P. Hurst, J. S. King and M. W. Berkey.

Kingwood Stone Company, of Kingwood, W. Va., to operate quartzite quarries in Preston County, W. Va. Capital $100,000. Incorporators: Joseph L. Keener, Harold G. Hodges, Cassius C. Brown and George C. Stoele, of Morgantown, W. Va.

Construction Notes

Acton, Ontario, is contemplating the erection of a Carnegie Library Building.

The congregation of Notre Dame Du Bon Pasteur, of Montreal, Can., will erect a new church.

The general contract for the erection of a 4-story stone addition to the convent for Soeurs des Saints Coeurs Jesus-Marie, 28 St. Louis Street, Joliette, Quebec, has been awarded to Albert Giroux, of St. Casimir.

E. I. Wilson, 101 Tremont Street, Boston, has prepared plans for an 8-room school building at Medford, Mass.

The Merchants Bank, of Canada, will erect a stone banking building, costing about $150,000, on King Street, W., Toronto, Canada.

A school and assembly hall will be erected at the State Normal School, New Britain, Conn., after plans by Davis & Brooks, Hartford.

A new high school building at Whiteboro, N. Y., will be erected, after plans by Pember & Campaigne, Albany.

The contract for the erection of a new exchange building for the Chesapeake & Potomac Telephone Company, at Washington, D. C., has been awarded to S. J. Prescott & Co., of that city. The amount involved is more than $800,000.

The contract for the erection of an Exposition Building at Wichita, Kan., has been awarded to G. H. Sudhoff Construction Company, Kansas City, Mo., at about $150,000.

Two barracks at the New York Soldiers' and Sailors' Home, Bath, N. Y., will be rebuilt, at a cost of about $100,000.

A 3-story stone and brick college building will be erected at Fort Williams, Ont., after plans by R. E. Mason, of that city.

H. Beck, Municipal Building, Buffalo, N. Y., is preparing plans for a 2-story school building in that city, to cost about $225,000.

G. G. Creighton, Halifax, is preparing plans for a $200,000 school building at Dartmouth, N. S.

The State Hospital Commission, Albany, N. Y., will build additions to the Manhattan Hospital at Randalls Island, costing about $700,000.

R. A. Herold, Sacramento, Cal., is preparing plans for a $150,000 hospital for Sacramento and Placer Counties to be erected in Sacramento.

It is estimated that the cost of the new prison at Wingdale, N. Y., will be about $1,750,000.

A. Meyers, Seventh and Locust streets, St. Louis, is preparing plans for a synagague for the B'Nai Amoona congregation, of that city.

Shattuck & Hussey, 19 South La Salle Street, Chicago.

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have prepared plans for a $300,000 Y. M. C. A. Building at Bayonne, N. J.

C. H. Johnson, St. Paul, Minn., has prepared plans for a $500,000 Nurses' Home in that city.

The city of Hazelton, Pa., will receive bids about June 1st for the erection of a $100,000 school building, after plans by E. E. Joralemon, of Buffalo, N. Y.

The Minnesota Masonic Home Association will erect a home and hospital in St. Paul, to cost about $130,000.

G. S. Idell, 34 South Sixteenth Street, Philadelphia, has prepared plans for a hospital building at Phillipsburg, Pa.

The Schwind Realty Company, of Dayton, O., will rebuild the Victoria theatre, store and office building in that city, at a cost of about $100,000.

Ballinger & Perrot, Arch and Seventeenth streets, Philadelphia, are preparing plans for a housing development at Wilmington, Del. The scheme calls for more than 500 houses as well as public work. The cost will be about $2,500,000.

S. Hannaford & Son, of Cincinnati, are preparing plans for a $250,000 hospital building at Memphis, Tenn., for the Methodist Hospital Association.

Chappell & Hunter, Charlottetown, N. S., have completed plans for a $100,000 Roman Catholic Church at Sydney, for which bids are now being received.

J. W. McNeill, 171 Manufacturers Street, Montreal, has the contract for the marble and tile work in the new $183,000 high school at Montreal West.

Jobin & Genois, 113 Cote d'Abraham Street, Quebec, have the contract for furnishing granite columns for the new $150,000 church that is to be erected in the Parish of Limoilou, Quebec.

R. T. Walker and L. T. Waid, New York, have prepared plans for an addition to the Dime Savings Bank, Fleet and DeKalb Avenues, Brooklyn.

Bids will be received until May 30th for a school building, to cost about $125,000 at Princton, Minnesota. The plans are by Foss & Foss, Elbow Lake, Minn.

Greeley, Col., and Windsor, Col., will build additions to their high schools, each to cost about $100,000.

John Russell Pope, New York, is preparing plans for a marble and limestone church, costing about $175,000, for the University Baptist Congregation, of Baltimore.

The contract for the erection of the Middlesex County Hospital at Waltham, Mass., has been awarded to J. P. Keating, Westboro, at $482,000.

The Canadian Pacific Railway is contemplating extensive alterations to its hotel, Chateau Frontenac, at Quebec. About $500,000 will be expended.

The Y. M. C. A., of Florence, Ala., is planning the erection of a $100,000 building.

The contract for the erection of a 12-story banking and office building, costing about $500,000, for the Central Trust Company, of San Antonia, Tex., has been awarded to J. P. Haynes, of that city.

The central Y. W. C. A., of Montreal, is planning a $150,000 addition to its building.

The army and navy veterans, of Cleveland, O., will erect a stone memorial building, 3 stories high and costing about $500,000, on the Mall, in that city.

Magney & Tulser, of Minneapolis, are preparing plans for an $80,000 church building for the Lutheran congregation, of Fargo, N. D.

The Masonic bodies of Detroit, contemplate the erection of a temple in that city.

Walker & Weeks, 1900 Euclid Avenue, Cleveland, are preparing plans for a banking and office building, with stone front, for the Central Savings & Trust Company, of Barberton, Ohio.

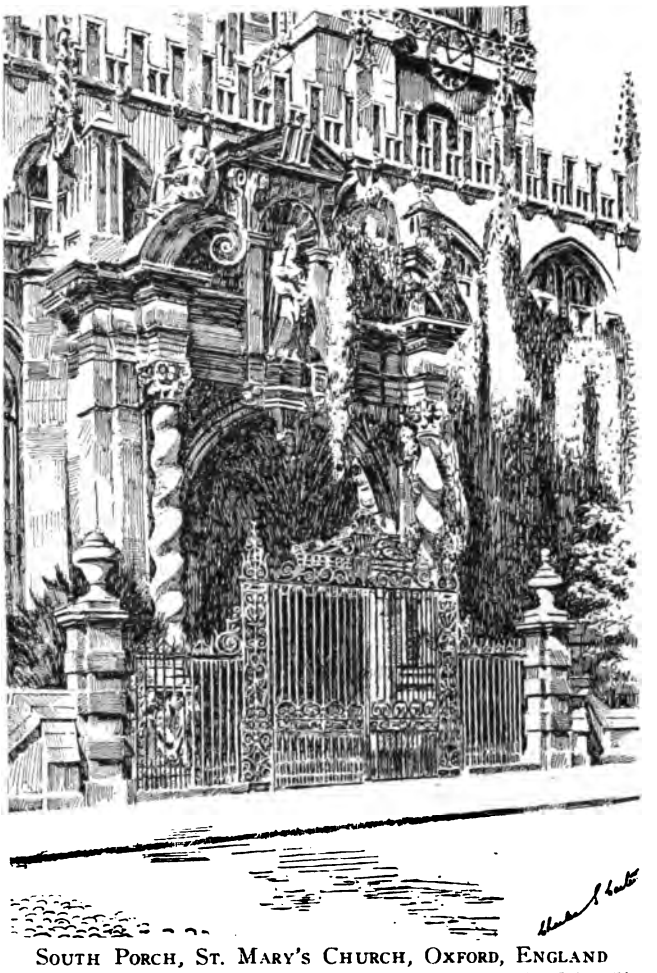
St. Hyacinth's Congregation, of Detroit, are planning the erection of a church, rectory and school, to cost about $300,000. The plans are by E. Brielmaier & Sons Company, Milwaukee.

Mobile County, Ala., will erect a $150,000 agricultural high school at Wilmer.

Spencer County, Ind., will receive bids June 3 for the erection of a 3-story court house at Rockport, to cost $150,000. The plans are by E. B. Dunlap, Indianapolis.

Plans are on foot for the erection of three large hotels in St. Paul. J. M. Sanford will erect a 12-story building, costing about $2,000,000; the Booth Hotel Company, a 12-story building, costing about $1,500,000, and the Minor Hotel Company, a 16-story building, to cost about $1,000,000.

Bids will be received about August 1 for the erection of a



South Porch, St. Mary's Church, Oxford, England
Designed by Inigo Jones in 1637, and restored in 1865 by Sir Gilbert Scott. From a sketch by Charles S. Carter, in the London *Architect*

church at Dayton, O., to cost about $175,000, for the Grace M. E. Congregation. The plans are by Schenk & Williams, Dayton.

The contract for the erection of the 3-story stone and brick building for the Y. M. C. A., at Lewistown, Pa., has been awarded to Steinbach & Sons, of that city.

Milwaukee, Wis., will erect a police station, to cost about $250,000.

A $100,000 school building will be erected at Jerome, Ariz.

All bids for the erection of a high and grade school at Groton, S. D., have been rejected and new bids are called for.

The beautiful new church of St. Christopher, at Baldwin, L. I., was recently dedicated. This is built of stone taken from the old Milburn reservoir.

Bids will be received about May 15 for the erection of a

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3-story addition to the high school building at East Chicago, Ind., to cost about $125,000. The plans are by J. T. Hutton & Son, of Hammond, Ind.

Albany, N. Y., is to erect a new public school building on New Scotland Avenue, of pressed brick with stone trimmings. The plans are by Fuller & Robinson, Albany.

Obituary Notes

P. H. McCue, vice-president of the Great Marble Company, of Milwaukee, and one of the most widely known marble men of the Middle West, died at his home in Chicago the past month, at the age of 58 years. Mr. McCue was president of the Chicago Marble Dealers' Association. He was born in Ireland and for many years had been identified with the marble interests. He is survived by a widow, two daughters and five sons. Mr. McCue had a wide acquaintance in the trade and was held in the highest esteem.

Jacob E. Robinson, secretary-treasurer of the American Marble & Granite Company of Tacoma for the past fifteen years, and a resident of that city for thirty-three years, died the past month at the age of 76 years. He was a native of New York State. His son is president of the marble company.

Business Embarassments

Three concerns have filed an involuntary petition in bankruptcy against the Lantz Company, which conducts marble works at 861 Main Street, Buffalo, N. Y. It is alleged in the petition that the marble company allowed creditors to obtain a preference by securing judgments.

At a sheriff's sale, sixty-seven shares of the Independent Lime & Stone Company, of Eden, Wis., were purchased by William Nast, of Eden, for $4,600. The sale was the result of a judgment obtained against Herman Nast and the Lime and Stone company.

The property of the Flint Granite Company, consisting of about 13 acres at the entrance of the Rural Cemetery, Albany, N. Y., was bid in by a representative of Charles H. Sabin for $33,000 at a foreclosure sale. The mortgage was for $12,000, and was held by Mr. Sabin, formerly of Albany, but now of New York.

Joseph Bewley has been appointed receiver for the Spalding Quarry Company, which operates a large quarry north of Atchinson, Kan. The quarry, which employes about 20 men, will continue in operation as it has many contracts on hand and also has some Government contracts. James Spalding, who has been in charge of the company, asked for the appointment of a receiver as a protection for the creditors. Mr. Spalding says the concern owes but $12,000 and that its assets are $42,000. A receiver will be enabled to borrow additional funds to continue the quarry. Considerable stripping of rock needs to be done and this requires the expenditure of more money. However, as soon as the stripping has been done it is believed that the business will make a good showing. The quarry made money last year but the river shifted and the profits had to be expended in the sinking of a large well from which to obtain water with which the stripping is done.

Trade Notes

The new Pollard openside junior jointer is a small, self-contained machine, built to suit the requirements of the smaller shops, but giving the same perfect joints as the large machine. By the use of this jointer slabs can be polished first and then jointed without the necessity of putting the slab on the rubbing bed in order to get a true and straight edge. The bed is six by four feet in size, and the arbor takes wheels up to 16 inches in diameter. The machine is splendidly adapted for cutting tiles or for working over second-hand slabs into bases, etc. It is either motor or belt driven and requires only ten to fifteen horsepower for operation.

Announcement is made that, for the purpose of promoting production and reducing expense, the marble business heretofore conducted by and in the name of John M. Ross, has been sold to the Knoxville Marble Company, of which Mr. Ross is president. Hereafter the entire business of both these organizations will be conducted under one management, and all contracts and unfilled orders of the former business will be completed by the Knoxville Marble Company.

Beginning with May 1, the headquarters of the National Association of Marble Dealers, formerly in the Marbridge Building, New York, were transferred to Milwaukee, Wis. The secretary of the organization is Victor Mosel.

A year or two ago mention was made in these columns of a new circular granite saw that had some unique features. This has been still further perfected, and the accompanying illustration shows the actual saw. This has detachable teeth and a positive and adjustable feed that will deliver the shot as required at the point of contact. The teeth are drop-forged and can readily be replaced at small cost. A special feature is to be found in the grooves on the forward and reclining edge of the teeth. Through these the saw, by centrifugal action, throws the shot continually outward against the stone, and the grooves direct the abrasive to the center of the saw face, where it does its work.

Circular Granite Saw

The Tompkins-Kiel Marble Company, 505 Fifth Avenue, New York, has a shipment of Italian, Tavernelle and Rosato marble in blocks of various sizes. The stock of foreign marbles is naturally very low at this time.

By a recent election, Charles Philip Coleman, who has been vice-president of the Worthington Pump and Machinery Corporation since 1916, has been advanced to the presidency of that organization. He was, prior to that, receiver of the International Steam Pump Company and Associate Companies, which have now been reorganized into the present corporation, which owns and controls some of the best equipped works in the country and is the leading interest of the world in pumping machinery and affiliated lines.

Mr. Coleman was born in Baltimore and has had a long experience in various engineering and railroad fields. He was made secretary and treasurer of the Singer Company in 1903, and during his incumbency of that position had charge of the construction of the Singer Building. The Worthington Corporation has eight large plants in this country, and a European works, and is turning out many products for this country and its allies in war works.

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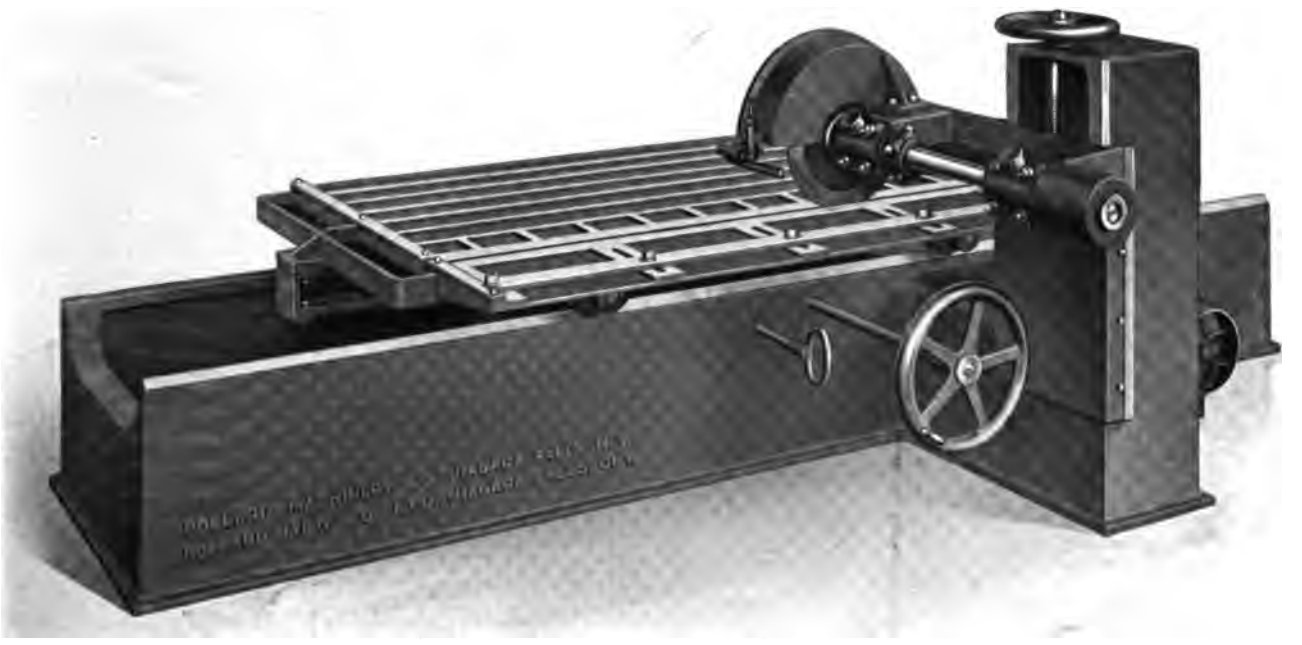
A NEW JOINTER



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This is the machine to work over your second-hand slabs. Work them over into strips, base, saddles, etc., and turn dead stock into money. Make tile out of small waste pieces—clean up the scrap pile.

This is the machine to set up on a large job to take care of misfits, salvage broken and damaged slabs, etc.

Table is 6 ft. 0 in. long, larger slabs can be cut by making two settings. Strips 12 in. wide or less can be "cut to gauge."

Table is 4 ft. 0 in. wide but wider slabs can be cut. The open side allows slabs to project over the edge. The center of wheel is 8 in. in front of the post, hence strips of any length can be cut off 8 in. or less in width.

Wheel can be raised and lowered so that slabs 4 in. thick can be cut, also moulded work can be done. Arbor takes wheels 16 in. in diameter and up to 3 in. wide.

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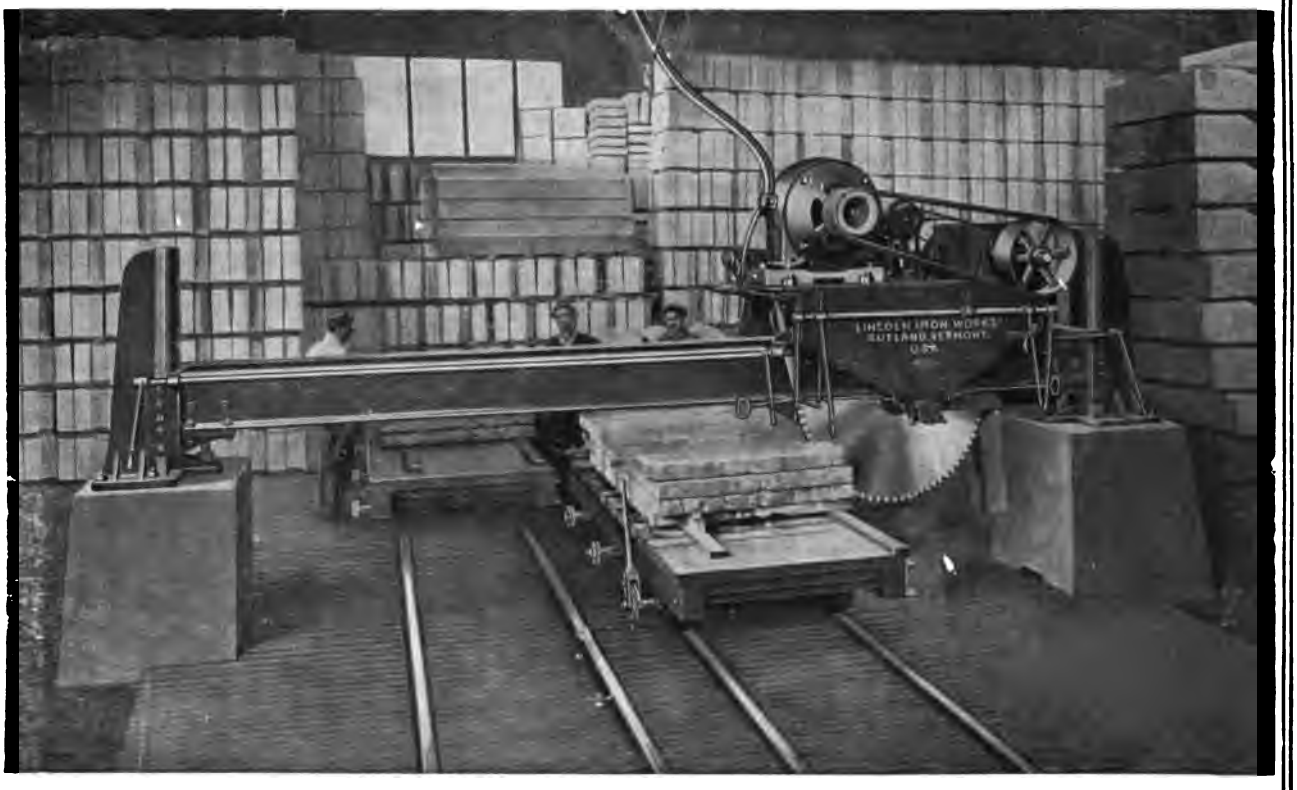

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[The picture shows Sullivan Plug Drills at work in a quarry of the North Carolina Granite Corporation, Mt. Airy, N. C.]

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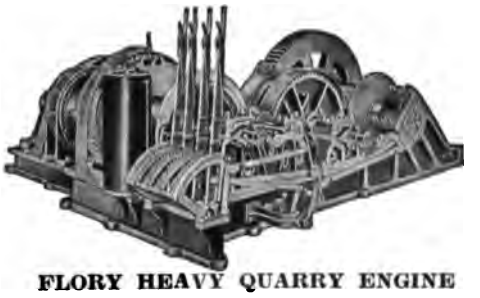

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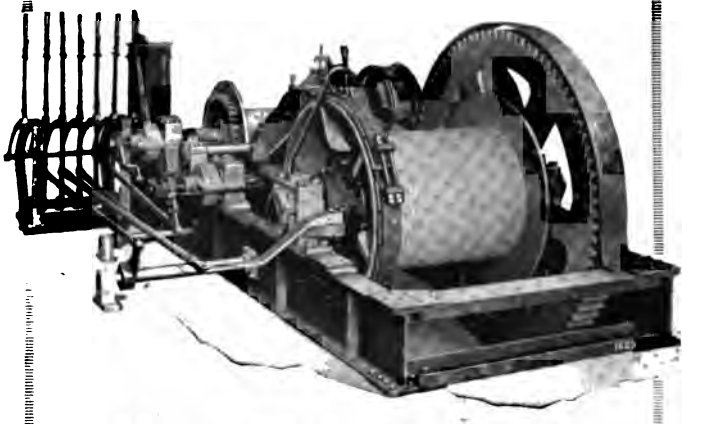

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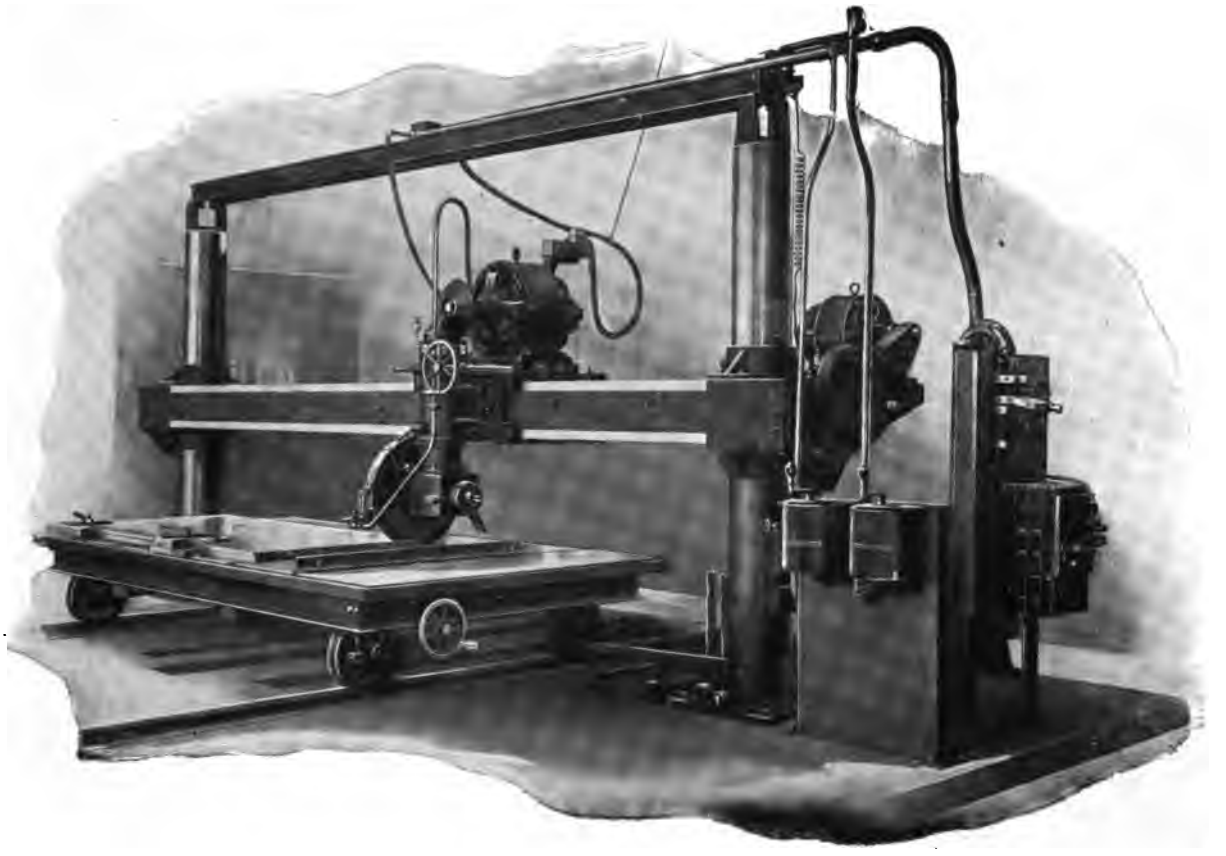

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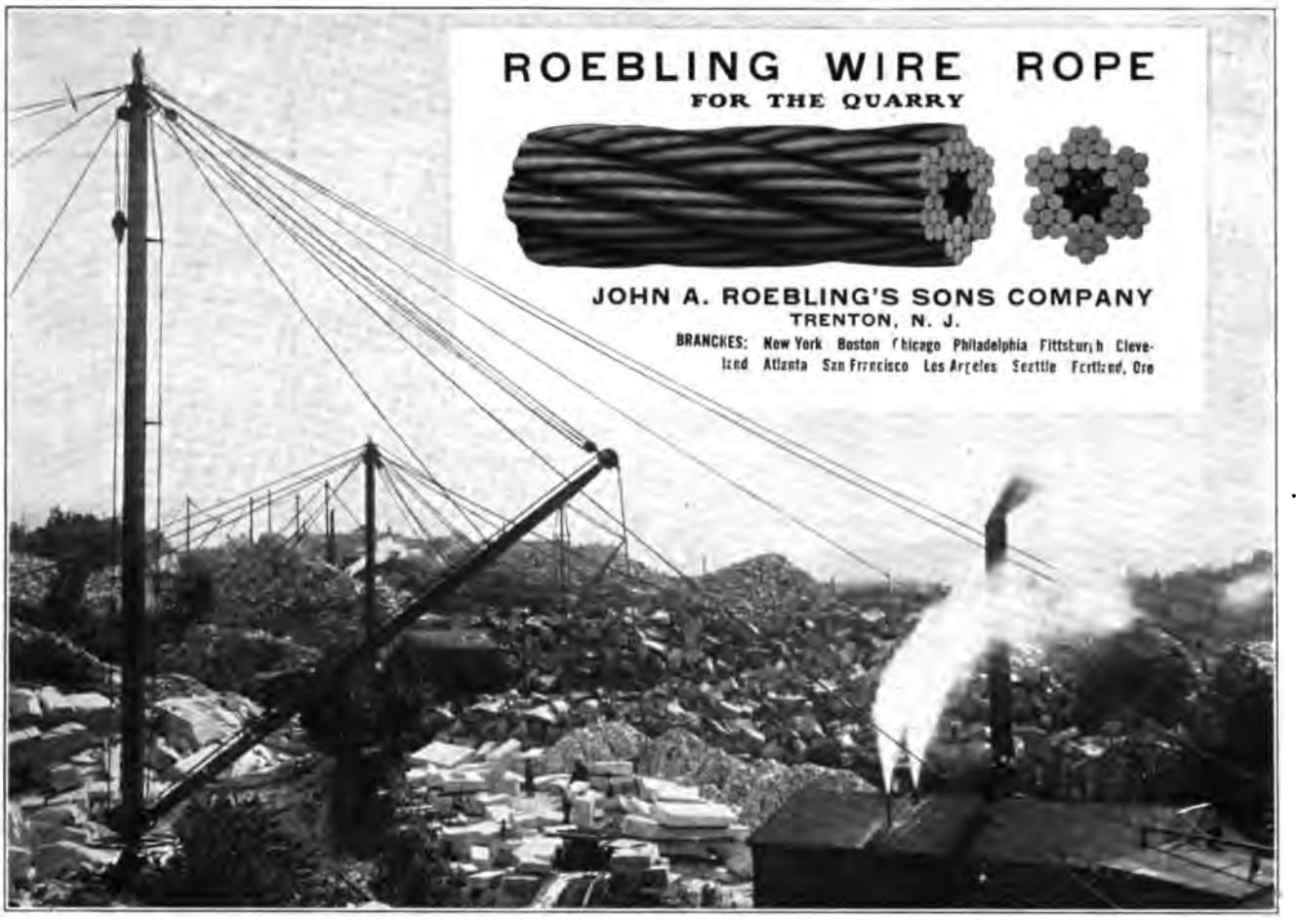
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CONTENTS

	PAGE
GRANITE FOR PAVING	267
ROMANCE OF STONE	268
CANADIAN ASBESTOS	268
ACCIDENTS IN QUARRY OPERATIONS	269
STONE BARNS OF ENGLAND	271
INDIANA BUILDING STONE	271
PUMPS FOR QUARRY SERVICE, *illustrated*	272
STONE HOUSES OF PENNSYLVANIA	273
STATE ASSISTANCE IN HOUSING	274
QUARRYING OF PHOSPHATE ROCK	274
GRAPHITE NEEDED FOR WAR PURPOSES	275
PLASTER OF PARIS FOR ART AND OTHER WORK	275
MONUMENTAL ART IN STONE, *illustrated*	276
THE SACRED MANGER CUT IN SOLID ROCK	277
STONE FOR FINE RESIDENCES, *illustrated*	277
HARDNESS AND STRENGTH OF STONE	278
EDITORIALS:	
Building Trades and the War	280
TRANSPORTING A BIG BLOCK OF STONE	281
OUR GYPSUM PRODUCTION	281
MARBLE AND GRANITE	281
A STONE GARDEN SEAT, *illustrated*	282
LIMESTONE AND SANDSTONE	282
BUSINESS BREVITIES	283
CONSTRUCTION NOTES	284
ILLUSTRATIONS:	
Louis Geyler Company Building, Chicago	
Gateway of Ely College, Cambridge, Eng.	
Capital of St. Marks, Venice	

ALPHABETICAL LIST OF ADVERTISERS

	PAGE
Appalachian Marble Co.	255
Ardolino Brothers	252
Bacon, Earl C.	288
Barnum, George	262
Barr, Thaw & Fraser Co.	252
Bedford Steam Stone Works	252
Blum & Delbridge	252
Books for the Trade	292
Bowman & King Stone Co.	252
Bowling Green White Stone Co.	
Brodix & Malone	260
Brown, George & Co.	257
Buckeye Gray Sandstone	
Building Stone & Clay Products	
Cameron, A. S. Steam Pump Wks.	295
Carr & Ball	252
Carthage Marble & White Lime Co.	252
Chicago & Bloomington Stone Co.	252
Clark-Conroy & Co.	252
Cleveland Stone Co.	263
Consolidated Stone Co., The	253
Continental Car Co. of America	287
Craig Co., John J.	258
Dallett Co., Thos. H.	293
Dark Hollow Gray Limestone	
Empire Engineering Co., Inc.	296
Empire Stone Co.	252
Farrell Foundry & Machine Co.	283
Fairmont Gas Engine & Railway Motor Car Co.	287
Falt & Co., J. P.	256
Frenier & Son	288
Furst-Kerber Cut Stone Co.	255
Georgia Marble Co. The	261
Gray "Canyon" Sandstone	263
Gray Eagle Marble Co.	258
Gillies & Sons, James	252
Hanlein & Son, Henry	256
Harrison Supply Co.	291
Heinlein Cut Stone Co., John	252
Hoosier Cut Stone Co.	255
Indiana Limestone Quarrymen's Ass'n	250-251
Indiana Quarries Co., Inside back cover	
Ingersoll-Rand Co.	288
Laidlaw Dunn Gordon Plant	293
Lidgerwood Manufacturing Co.	291
Lincoln Iron Works	290
Manning, Maxwell & Moore, Inc.	288
Marble & Marble Workers	258
Marine, Arlando	252
McDermott Stone Co.	262
McLaren & Sons, James	254
McMillan & Son, W.	256
Mt. Nebo Marble Co.	260
Meyers Machine Co., Inc., Willard F.	286
Middlebury Marble Co.	260
Miller Co., David	252
Monahan Stone Company	252
Napolean Gray Marble Co.	266
Nash's Expeditious Measurer	288
National War Savings Day	265
New Albany Machine Mfg. Co.	283
North Carolina Granite Corporation	257
Ohio Quarries Co.	264
Patch, F. R., Mfg. Co., Inside back cover	
Phenix Marble Co.	266
Pollard Mfg Co., Ltd.	289
Quincy Column Turning Co.	262
Riverside Machinery Depot	296
Rockport Granite Co.	262
Roebling's Sons, John A.	293
Ross & Republic Marble Co.	258
Royal Marble Co.	258
"Silk of the Trade"	257
Shaw Electric Crane Co.	288
Shea & Donnelly Company	255
South Dover Marble Co.	Back cover
Spurr & Son, J. J.	254
Star Stone Co.	260
Steam Stone Cutter Co.	290
Struble Cut Stone Co., Henry	252
Sullivan Machinery Co.	287
Sutermeister Stone Co., A.	252
Sylvan Green Marble Co.	260
Tompkins-Kiel Marble Co.	259
Trow & Holden	292
Victoria Marble Co.	258
Winnesboro Granite Corp.	257
Worthington Pump & Mach'y Co.	293

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The Louis Geyler Company Building in Chicago

(*See illustration on page 269 of this Magazine*)

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VIRGINIA
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Danville.
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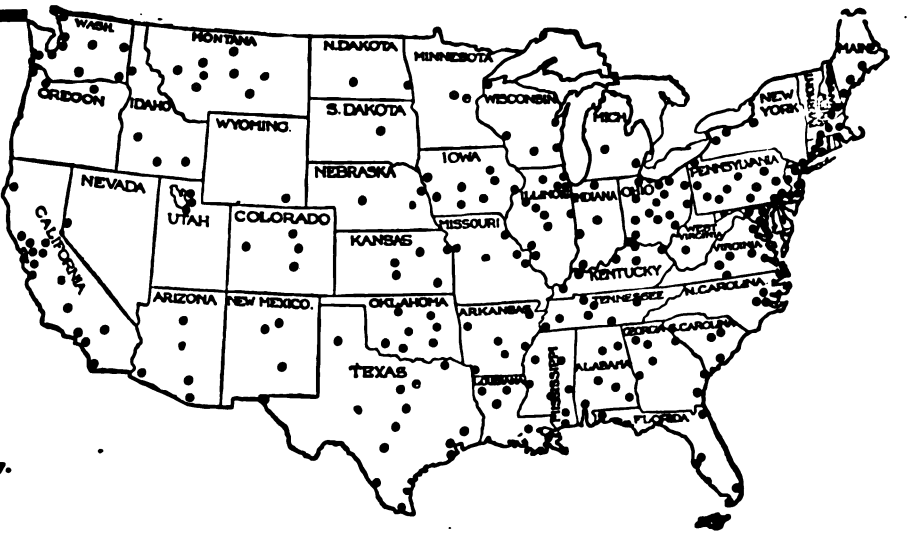

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STONE

VOLUME XXXIX JULY, 1918 No. 7

Building Revival Coming Soon

WITH the revival of building activity dependent to so large an extent upon the financial situation with regards to building loans, material and construction interests are regarding with keen interest the attitude of financial experts on building loans and are looking for the signs that may denote the beginning of a building revival.

Officers of several large financial institutions, heretofore important factors in making loans on contemplated building construction projects, concur in the opinion that the forthcoming building revival will be of gradual development, that there will be stringent control of new construction enterprises so as to avoid such conditions of demand over supply as to force building material prices to higher levels than now prevail, and incidentally to avoid anything approaching over-construction, says a New York exchange. Preference, it seems, will be given at first to structures having a purpose directly contributory to the commercial and industrial growth of this country and its allies, and speculative building construction in outlying sections of the city involving land exploitation will be delayed until more necessary construction has been provided for.

Builders may begin to look for signs of a new era of construction throughout the country in several directions, according to these authorities. The initial seed of encouragement to the careful consideration of building loan applications will come when it is apparent to financiers that the process of rolling back the enemy has reached such a point that financial interests can freely feel that there can be no retrogression. The next supporting factor will be open and official evidence that the Government's requirements for rush construction have been met to such an extent at least that general options on available building materials and supplies will not be necessary to the extent as at present exercised, so that manufacturers or jobbers supplying building supply companies, which in turn supply contractors, can be reasonably sure of making deliveries when ordered.

Still another factor determining the signs of revival in building activity will be official indication that coal can be spared for basic building material manufacture without interfering with the flow of fuel to ships of war or commerce. Still another financier thought a factor in determining the change for building and builders will be the manner in which the next and largest Liberty Loan will be subscribed. If the larger part of it is taken, as in the last loan, by the people, the effect will be much more favorable on building loan minds and will be more helpful to the builder and the building investor than will be the case if the banking and financial institutions of the country have to bear the greater part of the burden. The final factor, of course, will be complete victory.

Victory must be assured before builders can even hope for a return of normal times, said one financier, but he added: "Who expects normal times while we are at war?" Continuing, he said: "You must be very careful not to raise false hopes among the building interests at this time. Certain facts are, however, apparent to those who look for them. We must all work to win the war, and the consolation of the builder, the building investor and the real estate men throughout the country is, first, that the deprivations they are undergoing are registering mightily in France and Italy by making the money and material they would otherwise have used available for men and munitions, and, second, that they are laying up treasure into the future that will richly redound to them in interest and a building and real estate market that never would have been possible had it not been for the war.

"But the investor and the building fraternity must not expect a sharp revival of construction when the proper time comes for general building to proceed. Indiscriminate speculative building probably will not be favored as far as large lending interests are concerned. Structures having an important part to play in the country's commercial and industrial expansion will have first consideration. Under this broad classification it will be necessary to erect some apartment, office and loft buildings, tenements, hotels, terminals, warehouses, Federal buildings and some dwellings in estab-

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lished neighborhoods. Land exploitation will not be permitted to predominate in the first stage of the building movement. In the enforced withholding of building projects a demand for commercial and industrial building expansion has developed that must be met. Applications in this office alone reach to figures comparable with seven-tenths of the entire building program for Manhattan for the year 1913. The best, therefore, that can be said at present is that builders are possibly passing the deepest depression and, barring unforeseen adverse events, the upturn may fairly be considered as getting under way."

Another large lender spoke of the building future in this way: "Think first of the war that must be won. We have had to adapt ourselves as a nation to fit into unaccustomed spheres of activity and industry. We are beginning to find that we can fit and fight, and now that we are organized and operative abroad and at home it will not be long before other lines, like building and realty, will be co-ordinated so that it, too, can keep moderately active, to the end that more necessary construction work allied with commercial and industrial development may go ahead more freely."

Talc and Soapstone Output Grows

Talc is remarkable for its softness, slippery feel, and stability under a wide range of conditions, properties that make it useful for many purposes. Its soothing effect upon the skin makes it desirable for use as toilet powder, but it is most employed as a filler in paper. Much talc is used in the rubber trade, and the higher grades are employed in making electrical appliances and blanks for gas tips. The increased demands of the war have been met largely by increased domestic production. The total output in 1917, the maximum reached, was 198,613 tons, valued at $1,889,672, a gain as compared with 1916 of 3 per cent in quantity and more than 7 per cent in value, according to figures compiled by J. S. Diller, of the U. S. Geological Survey. There were 37 producers reporting to the Survey, of which 7 were in California, 6 in Georgia, 1 each in Maryland, Massachusetts, and New Jersey, 4 in New York, 6 in North Carolina, 2 in Pennsylvania, 5 in Vermont, and 4 in Virginia.

Heretofore New York has always been the first State in quantity and value of talc produced, but in 1917 its output was less than that of Vermont, although on account of the fibrous character of the talc produced in New York and its consequent high value for making paper, the total value of the output in New York is still greater than that of any other talc-producing State.

The quantity of talc imported for consumption in 1917 was less than 10 per cent of the domestic output, but a larger proportion of it is of high grade. More than half the talc imported comes from Canada and is of a grade that commands a higher price than the talc obtained from the principal domestic sources.

In its output of soapstone, which is extensively used for laboratory table tops, hoods, sinks, and laundry tubs, the United States leads the world, and most of it comes from Virginia. The resources of both talc and soapstone in the United States are large and are sufficient to supply the demand for most grades for many years to come.

California's State Building

The first stage of the competition for State buildings to be erected in Sacramento, Cal., at a cost of $3,000,000 (upon conclusion of the war) has resulted in the selection of the following eight architects, who will compete in the final stage of the competition, to be concluded September 15: Weeks & Day, Ward & Blohme and Bliss & Faville, San Francisco; Adolf Scherrer, Indianapolis; James Gamble Rogers, Dennison & Hirons and Tracy & Swartwout, New York; W. D. Hewitt, Percy Ash and N. C. Curtis, associated, Philadelphia.

Each of the above firms, besides being given an opportunity to compete for the final prize, will receive $2,500 for their efforts.

The jury of award was composed of Messrs. Henry Bacon and William M. Kendall, architects, of New York; Sylvan Schnaittacher of San Francisco; Governor W. D. Stephens; Chairman Marshall DeMotte, of the State Board of Control; State Librarian Milton Ferguson; Chief Justice F. M. Angellotti, and George B. McDougall, State Architect, the latter acting as architectural advisor.

Interest in the competition has been nation-wide. The records of the California State Architect's office show that approximately 359 architects requested information on the subject. Of this number 263 inquiries came from Eastern States and ninety-six from California. The total number of plans judged was eighty-four.

Tardy Recognition of Slate

An English newspaper says: "It is stated that the Office of Works, a Government Department, has actually dared to flout tradition in specifying for the use of Welsh slates for roofing a batch of 250 workmen's houses it contemplates building. This is a welcome indication of a change of attitude towards this deserving industry which it will be well for other departments to follow." Commenting upon this, one of the trade journals says: "The departure of the Office of Works from its customary line of action is rather remarkable, and hard to understand. If Welsh slates are worthy of being used now for roofing purposes, they were some time ago when the Office of Works appeared to have a decided prejudice against them. They were just as excellent a covering then as they are now.

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Granite Paving Block Industry

GRANITE paving blocks valued at $2,303,767, and numbering 30,978,305, were sold in 1917, according to a statement compiled under the direction of G. F. Loughlin, U. S. Geological Survey, in co-operation with the Granite Paving Block Manufacturers' Association of the United States (Inc.), and the Geological Surveys of Georgia, Maryland, Minnesota, Missouri, New York, North Carolina, Pennsylvania, Virginia, and Wisconsin. The quantity of paving blocks produced represents a decrease of 13 per cent compared with 1916, which in turn showed a decrease of more than 4 per cent compared with 1915. The value in 1917, however, owing to increase in price, was only 1 per cent less than that in 1916, which was practically the same as that of 1915. The average price per thousand during each of these three years was $48.85 in 1915, $50.73 in 1916, and $57.63 in 1917, the last being the highest price ever recorded. These figures do not include sales of "durax" blocks.

Sales were reported from 18 States in both 1916 and 1917, South Carolina replacing Delaware in 1917. Three States, Connecticut, Massachusetts and Vermont, showed increase in quantity in 1917. Maine showed a decrease of only 1 per cent. The largest decreases were in California (90 per cent), Georgia (50 per cent), Rhode Island (64 per cent), and Virginia (44 per cent).

Wisconsin continued to be the leading State in quantity sold, in spite of a considerable decrease, and was closely followed by Maine, which led in value of sales. Massachusetts, which ranked fourth in 1916, was third in 1917, displacing New Hampshire. Minnesota's sales fell below the 1,000,000 mark in 1917, and were exceeded by those of Vermont. The number of blocks made directly by producers in Vermont was not very large, but the sales of manufacturers who purchased rough blocks of Vermont granite are included, as their inclusion more truly represents the condition of the paving industry. In some granite districts of other States, blocks were made from rough stock sold by quarry companies to paving cutters, and the sales of these were included in the State totals; but in no other State was the number of these blocks so great as in Vermont.

The average price per thousand ranged from as low at $33 in Vermont and $44 in New Hampshire to $69 in Minnesota and $67 in Rhode Island. New Hampshire and Vermont showed decreases in average price per thousand of $1 and $3, respectively, in 1917. Virginia's average price remained the same as in 1916. The other States showed increases ranging from $1 in Rhode Island to $16 in California and Maine and $14 in Georgia. Notwithstanding the considerable increase in the average price in Georgia, the principal controlling factor in 1917 as in 1916 was apparently the ease with which the blocks could be prepared. Thus the average price in New Hampshire ($44) and in Georgia ($47), where easily worked granite blocks are abundantly produced, presented a contrast to that in Massachusetts ($58), where some of the granites are unusually hard, and with the average price in Wisconsin ($64) and in Minnesota ($69), where the granites are hard.

The New England States, which supplied the same general markets, sold 21,772,794 blocks, more than half the total, valued at $1,227,398, in 1917, compared with 21,764,024 blocks, valued at $1,060,538, in 1916, a gain of only 8,770 blocks, but of $166,860. This trifling gain in quantity was made in spite of the obstacles which beset the industry.

AN ARTISTIC NEW YORK ENTRANCE

Apartment House at Fifth Avenue and Seventy-fifth Street. Architects: Warren & Wetmore. Cut stone contractors: David Miller Co. Indiana limestone from the Indiana Quarries Co.

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Although a few producers reported general conditions better than in 1917, most of the larger ones, who reached distant as well as local markets, complained of shortage of labor and of transportation facilities, both by rail and water. It was also stated that some municipal improvement undertakings were postponed. Failure to make a more marked gain in 1917 was due to the abnormal conditions resulting from the war rather than to competition with other paving materials, although this factor also was of some influence. Paving blocks were shipped to many points in New England; also to New York, New Jersey and eastern Pennsylvania.

In New York, granite paving blocks were made in the Thousand Islands district, which is favorably situated with respect to markets in New York and along the Great Lakes. A large number of blocks were sold by two companies in 1917 but not so large as in 1916. The high price of blocks in 1917, caused by the high cost of operation and the increased cost of laying pavements, diminished to some extent the demand. Furthermore, the shortage of labor, boats, and cars made it difficult to supply the demand that existed. Owing to these conditions one company that was active in 1916 did not operate in 1917.

Pennsylvania and Maryland, supplying near-by though large markets, each showed a decrease of approximately 50 per cent in quantity sold. This large decrease was attributed principally to postponement of municipal improvements that had been planned.

The four Southern States—Virginia, North Carolina, South Carolina and Georgia—showed sales of 6,089,845 blocks (nearly one-sixth of the country's total), valued at $297,803 (about one-eighth of the total), in 1917, compared with 7,994,310 blocks, valued at $325,316, in 1916. The decrease in 1917 was 24 per cent in quantity but only 8 per cent in value. These States as a group supplied markets not only in the Southeastern States but in the Middle Atlantic and East Central States. The decline in sales was attributed to the high selling price and to a general curtailment of pavement laying, only absolutely necessary work being done. The price, however, was not sufficient to offset the increase in the cost of operation. Shortage of labor, fuel, and cars, as well as railroad embargoes, also reduced the output. Replacement of granite by other paving materials for all but the heaviest traffic was reported by one producer in a district where large quantities of rubble granite paving had been laid with results far below those obtained by laying well-trimmed blocks according to improved specifications.

The decline in sales in Wisconsin amounted to nearly 20 per cent in quantity and 18 per cent in value, the average price not increasing so greatly as in the districts already considered. This State supplied all its own cities as well as some cities along the Great Lakes and west of the Mississippi River. The decline was attributed to the high cost of labor and supplies and to shortage of transportation facilities.

This review shows that the decline in the sales of granite paving blocks in the eastern half of the country, which includes the principal markets, was due to temporary conditions caused by the war, which curtailed a normally increasing demand. Even in New England, where there was a slight increase in quantity, the conditions as a whole were below normal. In many cities, however, particularly in the Atlantic States, the increase in heavy traffic resulting from the war will necessitate the upkeep of granite-paved streets and the repaving with granite of streets on which other pavements have hitherto been adequate. Properly paved streets in districts of heavy freight traffic are a war necessity, and therefore a reasonable demand for granite paving blocks should be expected during the war, whereas a marked increase to compensate for the present curtailment in demand must be expected when the country is again at peace.

Only in California does the granite paving block industry appear to be more than momentarily discouraging. Producers there reported practically no demand in 1917, as brick, asphalt, and cement paving were being used almost exclusively. A considerable quantity of granite paving, however, was used in Los Angeles for repair work along gutters. No shipments to any other large cities in the Pacific Coast States were reported in 1917. These cities, when the heavy traffic around their freight terminals and in their principal business streets is considered, appear to offer a potential market for granite paving, provided the durability of granite pavements laid in accordance with the latest improved specifications can be adequately demonstrated.

Personal

Henry K. Holsman, architect, announces the removal of his office from 332 South Michigan Avenue, Chicago, to his Jackson Park studio, 1544 East Fifty-seventh Street, Chicago.

William A. Davis, of New York City, has been appointed a special agent of the United States employment service. He will visit manufacturing centers to discuss with manufacturers with war business and their associations the work of the employment service and ascertain how it may be of more help to them in finding workers. Mr. Davis has had long experience in manufacturing and organizing work. He has been a field representative of a number of employers' associations, including the National Association of Manufacturers, and was formerly secretary of the National Marble Dealers' Association.

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Sand for Building Purposes

IN builders' mortar, the sand is intended to form a bedding between the bricks or masonry, the grains being united by a cement-like compound which is formed between the sand and the lime. In concrete, the sand forms the finer portion of the aggregate, filling the interstices between the coarser particles and the sand grains are united by means of the cement.

In each case, the binding action is almost wholly confined to the surface of the grains, so that their interior is of minor importance. Consequently the shape rather than the composition of the grains of sand is important to the builder, because the shape and size will determine the extent to which the particles will interlock with each other, and this, in the presence of a relatively small amount of calcium silicate or portland cement, will form the strongest possible mass of mortar or concrete. The ideal building sand is one in which the grains, when covered with a film of slacked lime, will interlock perfectly writes Alfred B. Searle in the *Building World*, of London. Hence they should be sharp and angular rather than smooth and rounded. Of sands of similar appearance, the best has the fewest spaces between the grains.

A rough method of testing this is to weigh a biscuit tin or other convenient vessel, nearly fill it again with sand which is tapped until level and re-weigh. Water is then poured into the vessel until the sand is just completely covered. On again weighing, the amount of water which has penetrated into the pores of the sand will be ascertained, and may be calculated as a percentage of the sand used for the test. By this means the porosity or interstices of various sands may be ascertained, the sand with the lowest porosity being generally the best for building purposes.

Another useful method is to make test pieces by mixing the various sands with lime and so convert them into mortar, allow them to harden, and then grind them down to a thinness of about a thousandth of an inch. On examining these very thin slices under a microscope, it is easy to see the extent to which the grains are interlocked.

Most builders are satisfied if they are able to pass a little of the sand to be examined through their fingers. They judge by its appearance, and to some extent by the size and "feel" of the grains, and in many cases their conclusions are sufficiently correct. In several instances, however, sand has been carted a long distance simply because the clerk of the works or the builder misjudged the quality of a more accessible sand.

It is desirable to supplement what can be seen by the naked eye by the use of a powerful hand lens, as this will reveal many impurities not otherwise discernible. They may readily be distinguished from the clear and glassy quartz grains which constitute the true sand by their color and opacity.

The amount of clay or fine earth in a sand should be very small. To ascertain its exact amount is a slow and troublesome process, but a rough idea of whether a sand should be washed before use can be gained by placing a couple of ounces of sand in a tumbler of water, stirring well with a pencil or penholder, and noting the time required for the particles to settle. The clay and earthy matter will re-

JEWISH SOCIAL CENTER, WEST EIGHTY-SIXTH STREET, NEW YORK
Architect: L. A. Abramson, New York. Of dark hollow buff Indiana limestone from Consolidated Stone Company, Bedford, Ind. Michael Cohen & Co., New York, sales agent

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main suspended several minutes after the sand has settled, and some of the finest clay may not settle completely in a couple of days.

Dirty sand should not be used either for mortar or concrete, as the earthy particles tend to smear the sand grains and prevent them coming into proper contact with the lime or cement. If no mechanical washing plant is available, but water can be obtained, it is better to wash the sand in tubs or barrels by stirring it up repeatedly with water and pouring off the latter, than to use a sand which is unduly contaminated with clay or earth.

Very coarse sand is not usually so satisfactory as that of medium grade. An excessively fine sand is also objectionable. The grains should not all be the same size, as they would not furnish the requisite amount of interlocking, and would require an unnecessary amount of lime or cement.

Prizes for Small House Plans

Architects are invited to participate in a competition to solve the small house problem, same to be conducted by the Journal of the American Institute of Architects and the *Ladies Home Journal*. The latter will publish the winning solutions. Five prizes, of $1,000, $500, $250, $150 and $100, will be offered.

All treatises and plans must be sent prepaid to the office of the Journal of the American Institute of Architects, The Octagon, Washington, D. C., on or before October 31, 1918. No submissions will be accepted unless the requirements as to the three parts are fully complied with. A detailed programme will be sent on receipt of request.

The jury will be as follows: Thomas R. Kimball, president of the American Institute of Architects, chairman; Louis F. Post, assistant secretary, Department of Labor, Washington, D. C.; Thomas Adams, town planning advisor, Commission on Conservation, Ottawa, Canada; Herbert Quick, Farm Loan Board, Washington; Lawson Purdy, chairman Committee on New Industrial Towns, New York City; James Sullivan, representative of the American Federation of Labor on the Council of National Defense, Washington, D. C.; Edith Elmer Wood, legislative authority, Philadelphia; Frederick L. Ackerman, architect, New York City; Milton B. Medary, Jr., architect, Philadelphia.

Crushed Stone for Sulphite Mills

G. D. Jenssen & Company, of New York, have contracted for 80,000 tons of crushed rock from the plant of the Petoskey Portland Cement Company, just west of Petoskey, Mich. The stone is to be used in sulphite mills, in which this company is interested in various parts of the country.

Mr. G. D. Jenssen put in the sulphite plant at the Petoskey paper mill and is installing these plants in various parts of the country. The stone from the Petoskey crusher has been found well suited for the needs of these mills. The cement company is making plans to construct water shipping facilities at their plant during the coming fall and winter, so that these shipments of rock can be made by boat to the various paper mills on the Great Lakes.

Should Stock Up With Stone

For some time the argument has been put forth by the Indiana Limestone Quarrymen's Association that the trade should carry a stock of Indiana limestone either in blocks or in sawed shape, standard sizes. This because a great deal of industrial construction makes possible the use of Indiana limestone, providing it is readily available. Ready availability is assured by arranging for shipment at the convenience of the railroads and not waiting until a contract is booked or in sight, then expecting rush handling.

A case in point is the large factory building of the Grand Rapids Show Case Company, Grand Rapids, Mich., in which all the window caps and sills are Indiana limestone. This building was completed in twenty-one days. Wernette-Bradfield-Mead Company were the architects and Fred H. Hirth, of Grand Rapids, furnished the cut stone.

Immense stocks of Indiana limestone are available in the district for immediate shipment. These consist largely of stone quarried last year but to which a fair proportion of newly quarried material is being added currently.

Production of Asbestos Increasing

The asbestos industry of the United States is in better condition now than ever before, especially as to the quantity and the grade produced, and the outlook is encouraging. Most of the asbestos used in the large asbestos factories of the United States comes from Canada, but the growing appreciation of the high quality American fiber, especially that from Arizona, is a welcome feature of the industry.

The total quantity of domestic asbestos sold in 1917, according to J. S. Diller, of the United States Geological Survey, was 1,683 short tons, valued at $506,056, an increase of about 13 per cent in both quantity and value over 1916. Most of the domestic asbestos comes from Arizona, where the proportion of crude spinning fiber to that of lower grades is much larger than in Canada, so that the average price of American fiber in 1917 was $301 a ton, whereas the average price of that in Canada was only about $50.

Some years ago the opinion was expressed that as the Arizona fiber contains less iron than that mined in Canada it is therefore better adapted to use for electrical insulation than the Canadian fiber. This opinion has lately been confirmed by analyses made

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by R. E. Zimmerman, of Pittsburgh, whose investigations also indicate that the harshness of certain parts of the Arizona asbestos is due to thin films of calcite among the fibers.

A small amount of spinning fiber was mined in Fremont County, Wyo., from a contact deposit of remarkable interest.

The increased demands for asbestos due to the war have been met largely by increased imports from Canada. The imports of asbestos from South Africa and Italy have been largely cut off. The demand for imported asbestos for use in filters is being supplied by amphibole asbestos obtained from residual deposits of the crystalline rocks of Maryland.

Mica an Important War Material

Sheet mica has come to be an important war mineral through its use as an insulator in electric apparatus, especially in condensers, magnetos and spark plugs; in the windows of masks worn for defense against asphyxiating gases; and as a transparent, non-inflammable, non-shattering material, such as is needed in the windows of armored cars, in the conning towers of warships and of submarines and in automobile goggles.

The quantity of sheet mica produced and sold in the United States in 1917, according to W. T. Schaller, of the United States Geological Survey, Department of the Interior, showed an increase of 41 per cent over that sold in 1916, being 1,216,816 pounds, as compared with 865,863 pounds in 1916. No information is available to show what quantity of the domestic sheet mica produced would be suitable for any specific purpose, for the statistics include without distinction cut and uncut, clear, slightly spotted and stained, and heavily spotted and stained, as well as punch and washer mica. Sheet mica was produced in 1917 in eight States, which, grouped in the order of quantity produced, are North Carolina, New Hampshire, Virginia, South Dakota, Georgia, Alabama, Idaho and Colorado. North Carolina produced 48 per cent of the total quantity; New Hampshire ranked second, with 39 per cent. It may be said that the large producing States have done little more than hold their general average.

The prices paid for mica in 1917 continued, with minor fluctuations, to increase throughout the year. The prices paid for domestic mica in the South in 1917 were from 10 to 20 per cent higher than the prices for similar mica in 1916. The greatest increase was in the price of the smaller sizes, especially the 1½ by 2, 2 by 2, and 2 by 3 inches. The largest sizes showed no increase in price.

Melrose Abbey a Gift to the Nation

Melrose Abbey is to pass into the hands of the nation as a gift from the Duke of Buccleuch. This world-famous Border shrine was purchased for $90,000 from the sixth Earl of Haddington by Anna, Duchess of Buccleuch and Monmouth, in 1722. The Buccleuch family have taken the greatest possible care of the historic pile, and spent considerable sums upon it, previous to which it had a chequered career, and was oftimes so plundered and knocked about from motives of utility, religion and sheer wanton robbery that it is surprising it exists at all. It is one of the most interesting relics of late Gothic architecture in Scotland, and remarkable as the burial place of Alexander II, of the heart of the Bruce, of Michael Scott and many of the Douglas family. No more famous example of mediaeval British stonework is in existence.

FURNESS, WITHY & CO.'S BUILDING, WHITEHALL STREET, NEW YORK

Architect: Walter B. Chambers. Cut stone contractors: E. Shuttleworth Company. Built of No. 1 dark hollow gray Indiana limestone from the Consolidated Stone Company, Bedford

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American Marble in Porto Rico

UNTIL comparatively recent years, American architects had little experience in designing buildings specially suited for tropical climates. Then began the great development in Florida and Southern California and a little later we undertook the most extensive construction work in Panama, Cuba, Porto Rico, Hawaii and the Philippines. The Spaniards had created a characteristic style of architecture for sunny southern lands, and this was very sensibly used as the basis for our own tropical construction, with such modifications and developments as American enterprise and modes of life would suggest. It does not need to be said, however, that American architects would not be content with a mere slavish imitation. We have a "Mission style," and it is most effective in our hands, but it is by no means the same architectural style that was brought to this country in the train of the Spanish Conquistadors.

CATHOLIC CONVENT AT SAN JUAN, PORTO RICO
Designed and built by John Niggle. All the trim is Georgia Marble, bedded directly in the concrete without painting

One of the difficulties that confronts the builder in the tropic climes is the scarcity of suitable materials of construction. Wood is out of the question because the dampness of the climate rots it in a short time, and it suffers from the attacks of ants and other insects. Stone of a good quality is rarely to be had, except under transportation charges that are prohibitive. In many places there is the shell rock, coquina, that is used with good effect, but this is extremely soft, and is therefore not suitable for ornamental work that is to endure. This lack of material has given an opportunity for the use of stucco and concrete for walls. In pretentious buildings, stone would be imported for trim. In order to absorb as little of the heat as possible, white buildings are desired, and whitewash is freely used. This called for light-tinted stone for trim. Cement stains most stones, and careful waterproofing and protection was needed for cut stone set in connection with concrete.

Several years ago Mr. John Niggle took up practice in San Juan, P. R., as architect, contractor and builder. He designed a large group of buildings in that city for the Catholics, consisting of a church, school, rectory and convent. These were erected on Puerta-de-tierra Carretara in 1914-15, at a cost of a quarter of a million dollars. Naturally considerable ornamentation was required and the selection of a proper stone for trim was important. Mr. Niggle had worked in Georgia marble, and he made up his mind that this would suit his purpose, used in the way he intended. He buried a piece of the marble in concrete and left it embedded for three weeks. When taken out and brushed off, it was just as white as before, not a stain penetrating the stone. This was the material selected, and ten or twelve carloads of marble, all cut in the finishing plant in Georgia, were shipped by sailing vessel from Savannah. The Georgia marble was used for the door and window jambs, the window traceries and mullions, belt courses, corbels, etc. The backs and beds of the stones were not painted or protected in any way. The stones were simply placed in the forms and the concrete poured around them. Mr. Niggle's confidence in the marble was fully justified, as the buildings are today white and absolutely free from stains. This non-staining quality of Georgia marble is generally recognized. The government specifications for the post office at Morristown, N. J., finished in 1917, called for the coating with waterproof paint of the backs, beds and joints of all stone, "except Georgia marble."

Mr. Niggle first designed the church in Mission style, but it was not effective in so large a building, so he changed to the Romanesque. The sand for the entire job was taken from the ocean, dried and used in

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the concrete. This is not the usual practice in the island, but it gave good results. Mr. Niggle also built a small church in the Mission style at Miramar, P. R. These Porto Rican buildings have an interest from the fact that they are probably the first ones in which a delicate tinted stone has been bedded directly in concrete without any protection.

Patriotism and Slate Roofs

The great scarcity of natural slate and of galvanized roofing iron in Queensland has reminded the colonists of the utilization of hardwood shingles for roofing purposes that was once made there, says the *Slate Trade Gazette*, of England. But where galvanized iron has been used, its durability, or rather lack of it, has been found very unsatisfactory. Bearing on the question of shingles, a large poster is being displayed throughout the United States asking people to do all they can to prevent fires, which are a source of vast destruction of life and property. It is headed: "A patriotic duty of every American is to prevent fire. America at war needs every ounce of her energy and resources. It is criminal to cause hazards; it is unpatriotic to neglect them." Then follow a few hints. The poster winds up with the adjuration: "Help Uncle Sam, be careful."

How is it that our Allies are victimized to such an enormous extent by fires? Undoubtedly the primary cause is the use of inflammable roofs such as shingles, asphalt, tarred felt and composition roofings containing inflammable bases. It would, perhaps, have been better to have taken the bull by the horns some years ago and compelled householders, in their own if not the national interest, to have had a non-inflammable covering like slate. One can understand the colonists of Queensland falling back on shingles, for theirs is a case of Hobson's choice. They can get nothing else. Not so with America, where there is an abundance of good quality slate. Prevention is better than cure, and if Uncle Sam put his foot down he could reduce his big fire bill materially. A land of shingle roofs must always be a land of fires.

Mica Schist for Furnace Linings

Mica schist is one of the commonest kinds of metamorphic rock and consists essentially of mica and quartz, with which may be associated certain other minerals, such as garnet and staurolite. Owing to its marked foliation, its softness, and its generally unattractive appearance, it has not been greatly used as structural stone or as paving or crushed stone. It was once quarried near Bolton, Conn., for use as flagstone, but it was too soft to withstand the wear upon it in places of much travel.

The mica, to which the softness of mica schist is due, however, successfully withstands a very high temperature, and as the stone can be readily cut into blocks of the desired shape, mica schist has therefore been used considerably as furnace lining. The mica schist quarried for this use is found in eastern Pennsylvania, at places conveniently near the metallurgical plants in which it is required. The quantity of mica schist produced for this purpose in 1917 was 39,975 short tons, an increase of 6,739 tons, or 20 per cent, over 1916, according to statistics compiled by G. F. Loughlin, of the United States Geological Survey. The value of the output in 1917 was $85,986, an increase of $38,682, or nearly 82 per cent. The greater increase in value was due to a rise in price from $1.42 to $2.15 a ton, which largely represents the increased cost of production.

CATHOLIC CHURCH IN SAN JUAN, PORTO RICO
Designed and built by John Niggle. The trim is entirely of white Georgia marble, bedded in concrete

Artificial Marble in Denmark

A new limited company has been formed, with a capital of 300,000 crowns ($80,400 at normal exchange), for the utilization of a Danish patent for making artificial marble—a stonelike mass, which may be molded and which will stand exposure to wind and weather, writes Commercial Agent Norman L. Anderson, from Copenhagen. It may be molded with a smooth surface, so that the expensive polishing process is avoided. Experiments have shown it to be fully as hard and strong as real marble and other similar stone.

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Sawing and Working Sandstone

ALTHOUGH much block sandstone is sold to dealers in large centers of population, nearly all quarries that produce stone for building uses, or for grindstones, curbing, or flagging, with the exception of the bluestone quarries, have mills or finishing plants connected with them. The combination of sawing or otherwise finishing with quarrying has certain definite advantages. The quarryman understands his rock, he knows its peculiarities and defects, and knows how it should best be worked in order to minimize its weakness, writes Oliver Bowles in "Sandstone Quarrying in the United States." By sawing in accordance with unsoundness, or in such a manner as to give the best surfaces possible on blocks of stone containing defects of coloring or composition, the proportion of waste is much lower, and the serviceable stone may possibly be placed in a higher grade, than when the blocks are sawed without regard for such structures. Furthermore, the finishing of the stone in the vicinity of the quarry removes the necessity of paying transportation charges on the material that is wasted in manufacture.

Where possible, mills or other finishing plants should be placed convenient to the quarry. In some cases blocks are loaded directly on gang cars by the quarry derricks. For a quarry situated at a high elevation it may seem advantageous to place the finishing plant at the foot of the hill, as at Sherrodsville, Ohio. In certain other quarries situated at high levels—as, for example, those near Empire, Ohio—finishing is done at the quarry level and the finished product is transported to the foot of the hill by cable cars.

The situation of such plants depends also on the source of power and the situation of the power plant. It is wise to place the plant where it demands a minimum transformation of power from one form to another. Thus, if water power is available, connecting the turbines directly with the mill is simpler and much less expensive in first cost and maintenance than transforming the water power into electric power and driving the mill by electricity. If other circumstances permit, the mill should, therefore, be placed where such direct connection is possible. If electric generation is necessary for other purposes, it may, however, be advisable to use electricity for driving the mill also, and under such conditions its situation will be governed by other factors.

Water, steam and electric power are employed to operate saw gangs. Direct water power is simple and requires less expensive equipment than hydroelectric power. Direct steam power is employed in few places, as usually electricity is required for quarry operations, and therefore an electric generating plant is necessary. Electric power is applied to saw gangs in a variety of ways. In some mills individual motors are used for each gang, and in others one motor drives a group of 6 to 12 gangs. In the latter case a gang may be stopped by shifting the belt to an idle pulley. Certain advantages and disadvantages of the two methods may be enumerated. The use of individual motors makes easy the repair of motors without tying up the entire mill. On the other hand, the first cost of 10 individual motors is greater than the cost of 1 motor of sufficient size to drive 10 gangs. Moreover, the most economical speed of a small motor is higher than that of a large motor, and as gangs are operated with a relatively slow motion a greater reduction in speed is required for the individual motors than for the single motor of larger size. The greater the reduction in speed that is demanded the greater are the losses through friction and wear. Where individual motors are used, the crank shaft of the gang may be gear driven or belt driven. It is claimed that the vibration and jarring of gears has an injurious effect on motors and that on this account belts are to be preferred.

Gang frames are of various widths and lengths, depending on the sizes of the blocks sawed. Gangs in a single mill may be of various widths to accommodate blocks suitable for different purposes. Where there is great variation in the length of the stock, gang frames of different lengths are required. A sliding head has lately been devised which permits adjustment of a gang frame for length. Two types of gangs are in common use, the rope-feed and the screw-feed. The rope-feed gang is suspended by means of steel cables attached to counterbalance weights. The weights may be adjusted in such a manner that the gangs are allowed to exert any desired downward pressure of the saws on the rock. Thus a constant pressure may be maintained, and the rate of cutting will be governed by the hardness of the rock. If a hard, flinty mass is encountered, the rate of sawing is appreciably reduced until the obstruction is cut through. Screw-feed gangs are fed downward by gears, and, although the rate of downward motion may be regulated, the device is not self-adjusting. If a flinty mass is encountered, the rate of sawing is not automatically reduced, and if the saw is overcrowded, the blade is inclined to run to one side, with consequent production of an uneven rock surface. The screw feed is employed on nearly all modern gangs.

It is important that all bearings be properly capped to keep them sand-proof. Any looseness occasioned by wear should be taken up so that the shafts run in the bearings without play. Inefficient service is rendered if saw blades do not run true. The fault may be in the play of the shafts in the bearings or in improper setting of the blades. With improper adjustment of gang bearings or blades a side motion may accompany the backward-and-forward motion of a blade, and as a result the saw cut may be two or three times

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as wide as it should be, obviously involving waste of power, time, steel and rock.

When, in the course of sawing, the blades approach the bottom of the block there is danger of the lower edge of the block chipping off. If the lower face of the block is a sawed surface, the chipping off of edges may seriously mar the finished product. A simple device introduced by one Ohio company prevents such chipping of the edges. One end of the block is raised one or two inches higher than the other end, so that the saw reaches the bottom of the block at one end before it reaches the bottom at the other end. With such an arrangement the blade intersects the lower face at a long angle and the danger of chipping the edges is minimized.

Sharp sand is used commonly as abrasive in sawing. It leaves a smooth surface and causes no staining of the rock. Although crushed steel or steel shot cut 25 to 50 per cent faster than sand under similar circumstances, there are some disadvantages in their use. They leave a much rougher surface than sand, and if the rock is to be used for structural purposes the surface must be sand-rubbed, whereas if sand alone is used as abrasive this process may be omitted. If the rock is porous, there is danger of stains resulting from iron rust; this is overcome to some extent by mixing lime with the steel. Where the stone is to be used for such purposes as curbing and flagging a steel abrasive is very satisfactory. A mixture of sand and steel is commonly used.

In a Michigan quarry some years ago steel shot were crushed into soft iron blades by passing them between rolls, and thus a saw was produced with the abrasive contained within it. No information has been obtained of the success of the experiment, but the suggestion may be of value. One Ohio company tried carborundum powder as abrasive, and by this means increased the rate of sawing from 6 inches to 26 inches per hour. At first the method appeared to be an unqualified success, but it was soon found that the carborundum powder was rapidly pulverized to a condition of fineness that rendered it ineffective. Thus, although the rate of sawing is high, the cost of the abrasive is also high.

Centrifugal sand pumps are in common use for elevation of the abrasive to a point above the gangs, from which it may be distributed to the saws for repeated use. When the concrete bed beneath the gang is too flat, difficulty is sometimes experienced in getting the crushed steel back to the pump well for elevation. A device employed by one millman to assist movement of the steel is a belt made of discarded belting and provided with crossbars, by which the steel is carried back to the pump well.

An air lift is now employed successfully in a number of places. For raising sand in water, a well of sufficient depth is required to have about one and one-half times as much pipe submerged as above the water level. A jet of compressed air enters at the bottom, which agitates and aerates the water, causing it to rise in the pipe. The successful use of an air lift with crushed steel has not yet been demonstrated so far as is known. It is evident that a greater volume of air and more agitation would be necessary on account of the steel having a higher specific gravity than the sand. The great advantage of the air lift consists in its simplicity and the absence of moving or rotating parts, which are rapidly worn out by sand and specially by crushed steel. At some mills no pumps are employed, the abrasive being shoveled on by hand. Where river sand is obtained near by, it is commonly allowed to escape after one use.

The rate at which saws sink through sandstone blocks depend on a number of factors, such as length and number of blades, kind of abrasive used and hardness of the stone. Where gangs contain 10 to 15 blades and are employed in sawing average sandstone blocks 5 to 7 feet long, they sink at the rate of 3 to 8 inches per hour when sand is used and 6 to 12 inches

A North Carolina Granite Quarry

View in one of the quarries of Balfour Pink Granite of the Harris Granite Company at Salisbury

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per hour when steel is used. The rate is governed also by the nature of the product. In rough material, such as curbing, saws may be crowded to their maximum capacity, but when building blocks are being sawed such crowding is not permissible, as it may produce irregularities on the surface. The more indurated sandstones or quartzites can not be sawed profitably on account of their extreme hardness. When an attempt was made to saw the White Haven, Pa., quartzite parallel with the bedding, the saws would run in the softer reeds and then bind.

Gang cars, which take the place of the old-fashioned timber saw beds, are employed almost universally in sandstone sawmills. Transfer cars are used at Berea, Ohio; at some of the mills at Amherst, Ohio; at Fulton, Ohio; at Eagle Harbor, N. Y.; and at a number of other places. At some mills, where efficient service is rendered by derricks or traveling cranes, transfer cars are not employed. The writer is convinced, however, that the transfer car is an advantage in any case, as otherwise the gang is kept in idleness during the time of unloading and reloading the gang car. One company in Ohio found that the installation of a transfer-car system reduced the time during which the gangs were idle to one-third of what it was before the system was introduced. Derricks are employed for loading and unloading at this quarry. At one sandstone plant in Ohio a railway siding to the quarry passes in front of the mill and is utilized for a transfer-car track. During the time when railway cars are being moved on the siding the transfer car is removed from the track with a derrick. For most small mills, derricks are employed for loading gang cars. At the large mills overhead traveling cranes are found to give the most efficient service. They may be extended to serve adjoining mills, storage yards, etc.

For making third and subsequent cuts, saws other than gang saws are commonly used. Diamond saws have been tried in some Ohio sandstones, but have given poor service. Circular saws with carborundum teeth have given satisfactory service even in sandstones indurated sufficiently to make feasible their use as paving stones. A blade mounted with diamond teeth and set in a straight-cut gang frame is used to some extent.

Plants that are equipped for the production of building stone require rubbing beds, as many structural blocks require sand rubbing in order to give them smooth, even surfaces. Where sand is used as an abrasive in sawing, the resulting surface is commonly so smooth that bed rubbing is unnecessary. Where steel is used, however, the irregularities on the surface must be removed.

A simple device is employed by a Pennsylvania company for returning sand to rubbing beds. A 2-inch iron pipe is set in bearings, with one end over the rubbing bed, and is rotated slowly by means of a belt on a pulley. It is nearly horizontal, though slightly lower at the end toward the bed. At the opposite end is a second pipe about 3 feet long projecting at right angles The latter pipe is curved at the outer end in the direction of revolution, and as it revolves it dips into a trough into which sand and water drain from the bed. As the pipe revolves, the sand and water entering it run down through the rotating axis and are thus returned to the bed.

Exterior of Toronto Station Completed

The final stone for the completion of the exterior walls of the new Terminal Station at Toronto, Can., was laid on May 27. This is the largest and most complete union station north of the Canadian border. It is built by the Toronto Terminal Railway Company, comprising the Canadian Pacific and Grand Trunk Railway Companies. The architects of this structure are Messrs. Ross & Macdonald and Mr. Hugh G. Jones, of Montreal. The general contractors are the P. Lyall & Sons Construction Company, of Montreal, and the cut stone contractors are George Oakley & Son, Limited, of Toronto. The general style of the building is in Roman classical architecture, with plain and simple wall surfaces, sparing in ornament. This was probably the largest single contract for cut stone work ever awarded in the Dominion of Canada, and what is more, it has been completed in record time, notwithstanding the shortage of labor due to war conditions. With the exception of about 15,000 cubic feet of Queenston stone, from quarries at Queenston, Can., used in the base, the walls of the building are of Indiana limestone, furnished by the Indiana Quarries Company, of Bedford, Ind. About 200,000 cubic feet of this stone was required for the job. It was shipped in the rough, and was cut and finish at Sarnia, Can., where a special plant was erected for the purpose. The interior is being finished in a pink limestone from Minnesota, which is found to harmonize well with the general color scheme adopted for the building.

Mr. George Oakley, Jr., the general manager for the cut stone contractors, is naturally greatly gratified that it was possible to complete the exterior work in even less time than was anticipated. The severity of the weather the past winter made the setting of stone very difficult, but the entire 200,000 cubic feet was finished and in place within fifteen months.

Judgment Against a Sculptor

Property at Stone Mountain, Ga., of Gutzon Borglum, the sculptor, who recently made sensational charges in connection with the aircraft production program, has been advertised for sale at public auction to satisfy a claim of C. G. Baxter, ex-secretary to the sculptor, for $700 back salary. The property consists of equipment used by Borglum in carving a memorial to the Southern Confederacy on the face of Stone Mountain.

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STONE

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ACCORDING to newspaper accounts, impressive ceremonies marked the blessing of a "beautiful new imitation marble altar" in a Catholic church at South Bend, Ind. We must confess that we deprecate the attitude of mind that will use any imitations in the service of religion. Plaster or wood are good honest materials in themselves, but why should an effort be made to simulate a rare and costly stone? The altar is purely for the glory of the Lord. We ask, in all reverence, is there any idea that He cannot distinguish the true from the sham?

THE fear of a fuel shortage next winter has by no means been allayed. In some of the quarrying centers the shortage has already been felt, and has caused the curtailment of work. The conservation of fuel becomes a most important question in every line of industry. The present high rate of coal production is still insufficient to supply all needs and there seems to be no possibility of an increase in the output of the mines sufficient to satisfy every demand. There are two possible results of this fuel shortage; either certain industries must close down or more work must be done with the coal available. The Engineering Experiment Station of the University of Illinois has just issued a 90-page booklet printed in four colors which shows that the average small power plant can save 15 per cent of its fuel by the exercise of greater care in equipment and operation. This means a saving of twelve or thirteen million tons per annum if applied throughout the country. The purpose of the publication, the title of which is "'Fuel Economy in the Operation of Hand Fired Power Plants," is to present to owners, managers, superintendents, engineers and firemen certain suggestions which will help them in effecting greater fuel economy, and in determining the properties and characteristics of the coal purchased. Features of installation essential to the proper combustion of fuel are discussed, the practice to be observed in the operation of the plant is outlined; and the employment of simple devices for indicating conditions of operation is prescribed. It would be well for the stone industry to make a close study of this matter, and be assured that it has availed itself of every possible economy in coal consumption.

THE General Order No. 282 by the Central District Freight Committee, which calls for an increase on switching charges, if allowed to stand will practically stop operations in the Bedford and Bloomington stone district. Protests have been lodged with the committee and several conferences between the stone operators of the district and the proper officials have been held in Bedford and Chicago. The Bedford Chamber of Commerce has taken this matter up with Senators New and Watson and Representatives Cox and Bland with the view to securing co-operation. The freight rate advances recently inaugurated at first looked good, that is, when it was understood that the line haul rates would be advanced only 2 cents per hundred instead of 25 per cent. as applied to most all other commodities. It developed later, however, that increases would go in effect (which they did June 25th) which materially augment the cost of handling the material at the source, that is, within the quarries and throughout the district generally. The fact of the matter is that these switching increases range in the neighborhood of 1,000 per cent., although a hearing has been set and the likelihood is a material reduction will be made in these switching charges. It must be taken for granted, however, that the net result nevertheless will be a substantial addition to the cost of production of Indiana limestone. Communication with other quarry districts indicates that much the same situation exists there so that clearly considerable effort will have to be put forth by many interests in order to bring about a reasonable adjustment. It has also been found necessary to advance wages by a substantial amount, the average being computed at about 17 per cent. This is the third wage advance within a little more than a year and apparently barely has the effect of holding labor in the district. Previous wage advances were August 16, 1917, and March 19, 1917.

AS USUAL when concrete is concerned in any way, there were many people ready to hail the beginning of a new era when the United States Government started the building of concrete ships. We were told not only that these could be constructed at less cost and with greater speed than steel or wooden ships, but also that they could defy torpedoes and mines, and would be practically everlasting. All other types of vessels would eventually be discarded in favor of "poured" ships, and the Government was urged to spend its

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greatest efforts in ship building along this line. Now comes the awakening. The ships are just as vulnerable to attack as any other, and they are not expected to last long. An editorial in the New York *Evening Post* says: "The authoritative statement made at Atlantic City on Saturday that the Government does not believe that the concrete ships it has contracted for will surely last more than a year, is astounding indeed. No less than $42,000,000 has been set aside for vessels made of this material, yet the chief engineer of the concrete division of the Shipping Board, Mr. J. R. Wigg, declared, in speaking before the American Concrete Institute: 'They are expected to disintegrate. All that we are counting upon now is that they will last at least one and probably three years.' Structurally, he said, they were all that could be desired, and the first one, the Faith, had stood a severe trial, but they were, he insisted, merely emergency ships and the Government will apparently be quite content if it has them in full service for a twelvemonth. This is rather startling news, and will undoubtedly give rise to a warm discussion by the proponents of the concrete type. If what Mr. Wigg says is true—or even extending to five years the possible life of the ship—there is plainly no post-bellum career for this revolutionary method of construction." At a meeting of the American Society of Civil Engineers, Mr. Wigg also said that the concrete ship will be no more nearly proof against submarine attacks than steel vessels of a similar size. "The concrete ship," said Mr. Wigg, "should not act differently from the wooden or steel vessel. It has a very thin hull and if a torpedo tears a hole in it, it will sink. It will be no different in this respect from the ordinary ship. But in the 7,500-ton vessels we are building, a torpedo can pierce two compartments without causing them to sink. The concrete ship is structurally equal to a steel ship and is really a better vessel structurally. But we are not sure how long they will last. The ships of this kind which are now being launched naturally have some faults, but these will gradually be corrected. Corrosion of the metal and the cracking of the concrete are the two chief things to be guarded against in the concrete ship. The vibration of a concrete vessel has been shown, by experiment, to be about one-third that of a steel ship."

Builders to Help in the War

A conference of representatives of the building industries of New York was held the past month. The keynote of the meeting was that "the industries must be adjusted to the Government, and not the Government to the industries." The sentiment was expressed that in the past the various organizations represented in the building industries had been obliged to act singly in matters affecting their particular interests, and that now the time had arrived when unified effort should be made in order that the best results might be accomplished. A committee was appointed, representing various building interests of the country, to formulate and complete plans for a national organization, including the material, engineering, architectural and contracting industries. It is the purpose of the organizers to co-ordinate the building industries on a basis that would place them more easily at the disposal of the Government during the period of the war. With this object, Building Industries of New York has been formed.

In a recent statement the president of Building Industries, Roland Taylor, of the Building Trades Employers' Association, said: "Aside from the tremendous value of the work which this association is accomplishing during the war, its value to the Nation, to the city and to the building industry will be perhaps of equal importance during the reconstruction period when war ceases and peace returns. In submitting constructive suggestions to officials at Washington at their request, we pledge our organization to act for the best interests of this Nation in the successful prosecution of this war, which should be the first consideration of every patriotic citizen regardless of personal or local interest. This will be the policy of Building Industries. When war ceases we will strive with equal earnestness for the rehabilitation of the building industry of New York and of the Nation, which represents several billions of fixed capital, including 5,000 architects, 200 to 300 building exchanges, 100 or more national associations, 1,500,000 workers, all of whom are seeing day by day more clearly the value of practical constructive co-operation, intelligent foresight and timely action."

Motor Trucks in Stone Service

The disinclination of motor truck drivers to handle vehicles with which trailers are used, because of the extra work involved, is a handicap to the employment of trailers. A solution of this difficulty has been offered by E. C. Dunbar, manager of the Dunbar Stone Company, of River Rouge, Mich. He calls it a "trailer bonus plan" and describes it as follows:

"We have achieved very satisfactory results from the use of a simple bonus for the use of trailers. The drivers liable to call for trailer service are paid so much extra per hour through the month; they are in a class a little above the men hauling with the regular trucks, as they carry a helper and the others do not. In addition, every time a driver goes out with a trailer he gets a brass check. These checks he accumulates until pay day, when he turns them in and gets a certain amount of money for each in a separate check.

"There is encouragement for experiment with trailer drivers in the facts that the National Standard Cost System will put into the manufacturers' hands. The cost and operating forms themselves

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have space provided for recording the number of trailers, for the mileage over which they are used and for the number of tons they carry. The daily service record or driver's record provides similar spaces."

Building Outlook More Hopeful

"The government has at last made clear that it does not desire, and has never desired, to put a stop to necessary building construction," said N. F. Hoggson, president of Hoggson Brothers, builders, to a New York reporter recently. "The individual or corporation confronted with a building problem need only answer one question—'Is the building essential?'

"Secretary McAdoo has stated in unequivocal terms in a letter to Senator Calder, which forms a part of the Senate records, that 'there has never been any suggestion that buildings actually needed for the health and protection of the civil population, or for the conduct of essential business of the country, should not be constructed during the period of the war.' A great number of contemplated necessary building operations have been postponed because of an erroneous interpretation of the government's wishes. These should now go ahead.

"There has been every reason for the average person to believe that the attitude of the government was against building now. 'Economy-at-all-costs' advocates have spread the 'no building' idea to the point where to build during the war would amount almost to disloyalty.

"A committee of the Indiana Limestone Quarrymen's Association recently waited on Mr. McAdoo and made clear to him that his stand on the building proposition had been misunderstood. It was suggested that a new, clean-cut statement from him to the effect that the government meant to pursue a constructive policy would serve to dispel the fog of misapprehension. The secretary replied to the suggestion that in view of previous statements to the public on the subject, and the apparent misunderstanding which has arisen through them, further utterance would only serve to thicken the fog.

"Mr. McAdoo's letter to Senator Calder now makes it clear that the government does not regard all private building as non-essential."

Housing Problem in Germany

The United States Department of Labor has compiled an account of the housing conditions in Germany, which is taken from official German reports. Building has practically ceased in the great German cities, states this report. Only one-ninth as many houses were built in 1916 as in 1912, and the houses are much smaller. The total number of houses erected in the 45 largest cities in Germany was only 1,009 during 1916, and still less in 1917. The total number of houses erected in all Germany was much less than the number built in any one of a dozen American cities. In such cities as Berlin, Hamburg and Frankfort, building has long since ceased. Only in the great war industrial towns is there any construction of any kind. It is in these latter towns, such as Essen and Kiel, that there is any present shortage of houses. The war has depleted the population of Berlin and Hamburg so that they do not suffer even though they have less and poorer accommodation than formerly. So Germany has the spectacle of industrial towns packed to the point of discomfort, while her great cities are but partly filled. In Aix la Chapelle one house in 12 is idle; in Barmen, one in 15; in Berlin, one in 16; in Hamburg, which with its shipping and export trade was a rapidly-expanding hive of industry before the war, over 6 per cent. of the houses are absolutely vacant; in Bonn, 4 per cent. are idle; in Frankfrot on the Main, 5.3 per cent. No new houses are built and the old ones wear out, but the population is being depleted faster than the houses. But while the cities stagnate workmen are packed in the great munition cities. Less than 1 per cent. of the dwellings are idle in eight of the cities where war industries thrive. Among these cities are Essen, Erfut, Kiel, Lubeck, Stettin, Brandenburg, Konigsberg and Madgeburg. Conditions at Kiel are particularly deplorable. Only one house in 500 is vacant, and the number of uninhabitable places is normally higher than this.

Substantial Buildings in Los Angeles

After making a trip through the East, J. J. Backus, chief inspector of buildings in Los Angeles, Cal., submitted a report to the Board of Public Works, in which he declared that Los Angeles was as good as or better than any other city in the matter of first-class construction. The materials used are very largely stone, brick and hollow tile. Then he adds the following: "For the much talked of concrete house I find that very few such buildings are being erected and that nothing of this character which is not of undisputed stability is allowed to be erected."

Compressed Air Definitions

Upon the recommendation of its technical committee the Compressed Air Society has adopted the following definitions of certain compressed air terms in order to eliminate confusion as to their exact meaning:

Displacement—The displacement of an air compressor is the volume displacement by the net area of the compressor piston.

Capacity—The capacity should be expressed in cubic feet per minute and is the actual amount of air compressed and delivered, expressed in free air at intake temperature and at the pressure of dry air at the suction.

Volumetric Efficiency— Volumetric efficiency is the ratio of the capacity to the displacement of the compressor, all as defined above.

Compression Efficiency—Compression efficiency is the ratio of the work required to compress isothermally all the air de-

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livered by an air compressor to the work actually done within the compressor cylinder as shown by indicator cards, and may be expressed as the product of the volumetric efficiency. (The intake pressure and the hyperbolic logarithm of the ratio of compression), all divided by the indicated mean effective pressure within the air cylinder or cylinders.

Mechanical Efficiency—Mechanical efficiency is the ratio of the air indicated horse-power to the steam indicated horse-

THE STARGARD GATE, NEW BRANDENBURG
An interesting example of early Prussian stonework on the Haval, near Berlin

power in the case of a steam driven, and to the brake horse-power in the case of a power driven machine.

Overall Efficiency—Overall efficiency is the product of the compression efficiency and the mechanical efficiency.

The society further recommends that the use of other expressions of efficiency be discontinued.

Peculiar Fatality in a Quarry

A peculiar accident caused the death of a laborer in a rock quarry at Rochester, N. Y. The man was on top of a chute, pushing stone down into a car loaded by his companions, when he lost his footing and fell. He retained his hold on his shovel and the tool caught the sides of the chute and held him, while tons of rock fell on him.

Building Activity in Principal Cities

Building operations in New York State were very limited for April, 1918, amounting to a total of $8,500,000 for the first and second-class cities, as contrasted with $14,000,000, $21,000,000 and $23,000,000 of work reported for April of 1917, 1916 and 1915, respectively. This inactivity in construction work is the result of the Government's determination that nothing shall be undertaken except that which is absolutely necessary for war needs. Aside from such discouragement, a naturally deterring factor is the high price of building material and labor.

Accidents on the Job

Do not fail to give attention to a wound, even if very slight, says a Red Cross leaflet.

If proper first aid is not available it is safer to expose the wound to the open air than to cover it with unsterilized cloth.

Cut or pull clothing away from a wound.

Never insert anything in a wound and never wash a wound with water.

A wound should be treated with one-half strength tincture of iodine, which should also be applied for an inch around the edges of the wound.

Fractured bones should be properly secured in place before the patient is moved.

Watch for the nervous effect of shock, and treat it by lowering the head, loosening the clothing and keeping the patient warm and quiet.

Marble and Granite

The big crane in the plant of the Vermont Marble Company in Tacoma, Wash., is proving very useful for installing boilers in the Emergency Fleet steamers built by the Seaborn Shipbuilding Company, of that city.

The contract for a new floor in the post office at Watervliet, N. Y., has been awarded to the Conroy Marble & Tile Company, of Troy.

According to the report of the Georgia Commissioner of Commerce and Labor, the marble and granite quarries and marble yards in that State show 112 plants, capitalized at $4,150,000, using raw materials valued at $1,114,000 and manufacturing all classes of marble and stone products, valued at $3,652,000. The average daily number of wage earners is 3,000, and they received for 1917 $1,540,000, the officers and clerks receiving $145,600.

Peter Cleary, 115 Marion Street, Brooklyn, has been awarded the contract for remodelling the exits and installing a marble wainscot in St. Teresa's Church, Sterling Place and Classon Avenue, Brooklyn.

The Eureka Marble & Tile Works have installed a complete plant at Columbus, O., and will do a general business in marble, tile and slate. Philip McDonough, a well-know marble man of the Middle West, is the general manager.

A new marble floor has just been installed in the vestibule of the Synagogue of Baith Israel Anshei Emes, on Harrison Street, Brooklyn. It was a gift from the Jewish Circle.

The new $200,000 St. Coleman's Catholic Church in West Sixty-fifth Street, Cleveland, has just been dedicated. It is in the Romanesque style of architecture. The majority of the parishers are of Irish birth, and all of the altars and other marble finishings are of Carrara marble, cut by craftsmen in Dublin.

T. L. Watson & Company, bankers, of Bridgeport, Conn., will erect a new two-story granite banking building on John and Main streets, in that city.

Tonella & Sons, of Milford, N. H., are cutting and shipping about eighty granite blocks for the Wolcott Memorial, which is to be erected in Lake Park, Milwaukee, in honor of the city's dead soldiers and sailors.

The new hospital of the Cleveland-Cliffs Iron Company, at Ishpeming, Mich., is to be finished on the interior with marble from the Michigan Verde Antique Marble Company, whose quarries are near Ishpeming. Large blocks of the marble are now in the city, ready for sawing, polishing and cutting. The marble will have to be sent away to be finished, as there is no mill at present in Ishpeming, although the establishment of one is contemplated. The work of building the spur track to the quarries has not yet been completed, owing to the difficulty in securing labor.

The War Trade Board, under date of June 20, announces that it will consider, among other commodities for exportation to European Holland and Denmark proper, alabaster and marble for statuary.

Government Takes Over a Quarry

The property of the South Construction Company, consisting of a stone quarry and equipment near Sellersburg, Ky., has been taken over by the Government and the output will

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be used in Jeffersonville. Crushed rock is used for many purposes at the Government Depot, and it will be hauled there from the quarry. The mogul and seven freight cars that belong to the Louisville & Southern Indiana Traction Company have been taken over with the quarry, and from now on no person or corporation can purchase crushed stone from the South Construction Company unless the demands of the Government should be satisfied. The company has been furnishing stone to New Albany and Floyd county for street and highway purposes, but the supply from now on will have to be found elsewhere. The taking over of the property has solved the question of where the Government was to secure rock for building streets at the depot and for other purposes. At one period it practically was decided to open a new quarry, and an estimate on the cost of machinery was made. The quarry on the Bailee L. Burtt farm was considered at another time.

Limestone and Sandstone

At a meeting of the stone operators of the Bedford district, it was decided to grant a general wage increase, to take effect June 16. The greatest advance was given to the class drawing the lowest pay, and amounted to about 17 per cent. Other advances ranged from *2 to 15 per cent. The increase applies to the entire district.

The No. 1 mill of the National Stone Company, near Bloomington, Ind., was destroyed by fire the past month, resulting from a hot boxing on a line shaft. The loss is $15,000, with no insurance.

The Bridgeport, Tex., Cement & Stone Company has opened a crushed stone office at Cleburne, Tex.

A boiler in the limestone quarries of the Wharton Steel Company, near Franklin, N. J., exploded recently and killed two employees. The entire boiler house was blown to bits.

Official recognition of the economic value of agricultural limestone is contained in a Kentucky law regulating its transportation, says a Chicago agricultural paper. The act specifies a scale of maximum freight charges on limestone during the period of the war. These vary from 30 cents per ton for a 30-mile one-road haul to $1.60 per ton for a haul of over 360 miles. The rates are not so low as those already operating for years in Illinois, which are half a cent a ton per mile, with a 25-cent minimum charge, but they are counted a great advantage for Kentucky farmers whose use of limestone has been hindered by high freights. In order to secure the special rates the consignee must certify to the Commissioner of Agriculture, Frankfort, Ky., that the limestone is to be used for agricultural purposes, the amount ordered and from whom, giving the name of the station where the shipment originates.

A large part of the machinery of the Hoadley stone mill, south of Bloomington, that was damaged by fire, has been sold to a Chicago firm. This sale included tramway, traveler, three boilers and some electrical equipment, and was for $16,000, the high price being brought because such machinery cannot be got now at any cost.

The Ohio Fuel Supply Company will erect a five-story office building at Front and Elm Streets, Chicago. All the trimmings will be of Indiana limestone.

New Companies

The Bunker Hill Stone Company, of Bunker Hill, Ind., to do a general construction business. Capital $5,000. Directors: Benjamin F. Hatfield, John L. Miller, Jeremiah O. Ault, W. T. Turley.

The Principio Sand & Stone Corporation, of Wilmington, Del., to deal in stone, sand, gravel, etc. Capital, $300,000.

Elmwood Monument Works, of Elmwood Park, Ill., to manufacture and sell granite and marble. Capital $2,500. Incorporators: James A. Steven, N. M. Jones and D. P. Richards.

The Ingalls Stone Company, a Delaware corporation organized to do a general quarrying and stone business, has qualified to do business in Indiana, $375,000 of its capital stock being represented in that State. C. C. Ingalls, Bedford, is named as agent.

The Eureka Marble & Tile Works, of Columbus, O., to manufacture and deal in marble, tile, etc. Capital $25,000. Incorporators: C. Lowensohn, Z. C. Yost, L. Geiger, L. W. Hunt, C. A. Pierce.

The New Jersey Limestone Quarries, of Belvidere, N. J., to quarry and deal in limestone. Capital $100,000. Incorporators: Aaron D. Keller, William F. Glose, Daniel C. Reilly, Bethlehem, Pa., and Charles A. Dahlke, Belvidere.

The Orbisonia Lime & Lumber Products Company, of Dovel, Del., to manufacture lime and the burning and refining of limestone. Capital $100,000.

F. T. Horton Company, of Hoboken, N. J., to manufacture and deal in lime. Capital, $25,000. Incorporators: Forest T. Horton, Anna Horton, West Orange, N. J.; Theodore Lane, Long Island.

MEDIAEVAL FRENCH STONEWORK
West entrance, Church of St. Gertrude, near Caudebec-en-Caux. From a sketch by H. Raine

Hooker Crushed Stone Company, of Chattanooga, Tenn., to quarry and deal in stone. Capital, $5,000. Incorporators: G. H. Jacoway, G. Shalliday, A. Shalliday, J. B. Sizer, John A. Chambliss.

To Investigate Power Plant Efficiency

The United States Fuel Administration announces the appointment of Henderson W. Knott to manage the field force of engineers and inspectors which is at work among the power plants of the country, carrying out a campaign of instruction and inspection designed to bring the use of fuel for the production of power to the highest possible efficiency and economy. Mr. Knott has been the general manager of the

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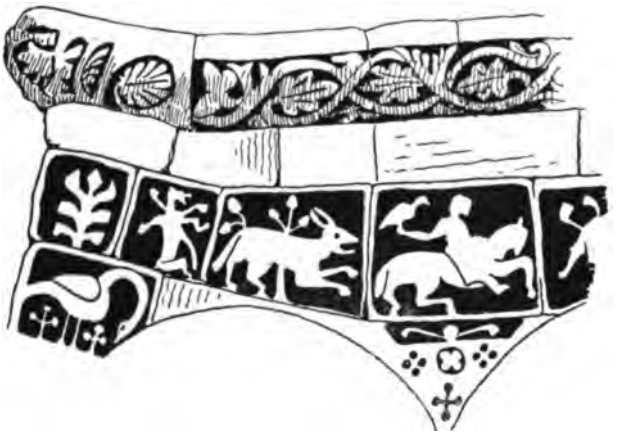
Morgan Crucible Company, of New York City. The appointment of Mr. Knott is a part of the plan originated by David Moffat Myers, advisory fuel engineer of the Fuel Administration, to have each of the 250,000 steam plants in the United States visited by a competent man who can make suggestions and report in connection with the questionnaire originated by Mr. Myers, working with committees from the four great engineering societies. This work will naturally require a large number of inspectors devoting their time to traveling among the steam plants. This field force will be organized by states in order to give it greater force and efficiency. Many of the state heads, who work directly under the



MARBLE WORK AT SAN MICHELE, LUCCA, ITALY
A portion of the inlaid carving which covers the entire arcade and many of the columns

State Fuel Administrators, have already been appointed, and Mr. Knott, co-operating with Mr. Myers, will complete the list of state appointees. Mr. Knott will, at an early date, visit the states already organized to study the work being done by the men in the field, and to speed up the inspection program.

Business Brevities

The Elgin County, Ont., commissioners have purchased two farms for $11,000 in order to obtain an adequate supply of gravel for road improvements.

Local switching charges have been increased under orders of the Railroad Administration. This will result in doubling the charges on many commodities, such as sand and gravel, moving under commodity rates and originating within switching districts. No carload shipment will be accepted for even local switching movement at less than $15 a car.

The city of Burlington, Vt., is in immediate need of one thousand tons of crushed stone for road work.

The German American Clay Company, of Muncie, Ind., has changed its name to the American Clay Company.

The Public Works Department of Boston announces that all its resources are now engaged in street improvenemts for the coming year, the greatest in the history of the city. Eighteen important streets will be repaved, most of them with granite blocks. The repairing of Atlantic Avenue, the biggest job on the list, will be done with smooth granite blocks at an estimated cost of $366,000.

Queens Borough, New York, will spend $1,109,400 for local improvements, much of it for paving and street work.

Judgment by default has been entered in the Court of Common Pleas at Hartford, Conn., for the Hartford Sand & Stone Company to recover $13,167 and costs of $29.04 from Frank A. Coburn and wife of West Hartford.

A new wage scale for the stone cutters in the Philadelphia jurisdiction, which went into effect on June 1, established an increase from 65 cents to 72½ cents an hour for cutters and one dollar more a day for carvers and sculptors. It is also stipulated in this year's new agreement, for the first time in the history of that organization, that the association shall include machine stone cutters.

The city of Quincy, Ill., has paid the first yearly installment of $2,000 on the Campbell Brothers' stone quarry, north of the city, purchased by the municipality for $6,128.69. The city, with certain reservations, is given the right to put the quarry to use at any time thereis to be no interest charge on deferred payments of purchase price.

Allen County, O., will furnish a large amount of crushed stone from the county plant for repairing the Dixie and the Lincoln highways within its boarders.

The Schwind Stone Company has purchased a tract of unimproved land at Lanvale and Popular Grove streets, Baltimore, Md., for $4,650.

Government Work

Sealed proposals will be received by the Lighthouse Inspector, Baltimore, Md., until July 15, 1918, for furnishing and placing riprap stone at light stations in the Fifth District.

The Lighthouse Inspector at Boston, Mass., will purchase 4,850 tons of granite riprap stone.

Bids will be received by the Supervising Architect, Treasury Department, Washington, D. C., until July 18, for the erection of a new post office at Eldorado, Kan.

Bids will be received at the United States Engineer Office, Custom House, New Orleans, La., until July 12, for furnishing and delivering stone for Head of Passes and Southwest Pass, Mississippi River.

Construction Notes

The Royal Bank of Canada, Montreal, has purchased a site in Nanaimo, B. C., and will erect a branch banking office.

A clinic building of Tyndall stone will be erected at Swift Current, Sask., after plans by Reilly, Dawson & Reilly, of that place.

The Winnipeg, Man., General Hospital will erect a psychopathic building, after plans by J. H. G. Russell, of that city. It will be trimmed with Tyndall stone.

The Dime Savings Bank, Fleet Street and DeKalb Avenue, Brooklyn, has awarded the general contract for a $70,000 addition to its banking building to the William L. Kennedy Construction Company, 100 William Street, New York. The architects are Walker & Ward, 52 Vanderbilt Avenue, New York.

Bids will be received until July 15 for a stone and brick high and grade school at Cattaraugus, N. Y. The architect is W. T. Towner, 100 Morningside Drive, New York.

The Norwegian Lutheran Zion congregation, of Port Richmond, S. I., will build a new church.

The Brooklyn Eye and Ear Hospital will erect a new hospital building, costing $200,000, on Schermerhorn Street. The plans are by Crow, Lewis & Wickehoefer, 200 Fifth Avenue, New York.

The contract for the erection of the new $200,000 banking building for the National Bank of Charlotte, N. C., has been awarded to C. T. Wills, Inc., of New York.

J. McNabb & Son, Grand Rapids, have been awarded the contract for the erection of the new hospital for the Sisters of Mercy, at Muskegon, Mich. It will cost about $160,000.

St. Hyacinth's congregation, Wolfram Street, Chicago, will erect a $250,000 church.

Gregg & Leisenring, Washington, D. C., have prepared plans for a church and Bible school for the Lutheran Church of the Incarnation, in that city.

The contract for the erection of a new banking building of granite, limestone and brick at Darien, Conn., for the Home

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Bank & Trust Company, has been awarded to F. H. Wakeham, 4 West Forty-seventh Street, New York.

The Department of Public Works of Canada is planning the erection of a $1,000,000 home for soldiers at Winnipeg.

The Y. W. C. A., of Charlestown, S. C., will erect a new building.

The First National Bank, of Alexandria, La., will erect a ten-story banking and office building, to cost about $300,000. The architect is E. Weil, New Orleans.

The American Exchange Bank, of Milwaukee, Wis., is planning the erection of a ten-story banking and office building.

Kemper Military School, of Boonville, Mo., will erect a school building, costing about $100,000. The architect is T. W. West, Sedalia, Mo.

St. Paul's congregation, of Ottawa, Can., will build a stone and brick church, costing about $75,000.

T. Eaton Company, 190 Youge Street, Toronto, Can., will erect a $1,000,000 office building with stone trim.

Grace Episcopal Church, College Hill, Cincinnati, O., will build a stone parish house, with equipment for Sunday school and gymnasium classes and rooms for meetings of church organizations.

A. S. Alschuler, 28 East Jackson Street, Chicago, is preparing plans for a two-story branch library for the Chicago Public Library.

St. Stanislaus Kosta Church, of Niagara Falls, N. Y., will build a parochial school, costing about $75,000, after plans by W. H. Zawadski, 798 Fillmore Avenue, Buffalo.

The Federal Reserve Bank, of Kansas City, Mo., is planning the erection of a banking building at Grand Avenue and Tenth Street, in that city, to cost in the neighborhood of $750,000.

W. R. Briggs, Bridgeport, Conn., is preparing plans for a new building for the City National Bank, of that city.

A $100,000 addition will be built to the Technical School at Ottawa, Can., after plans by J. A. Ewart, of that city.

The Elks of Beaumont, Tex., will build a club house after plans by Watson & Steinman, of that city.

Whiton & McMahon, Hartford, Conn., are preparing plans for a $250,000 school building in that city.

Los Angeles County, Cal., will erect a $100,000 hospital at San Fernando.

The First Methodist congregation, of Paris, Tex., a merger of two congregations, will build a new $100,000 church.

The Masons of Allentown, Pa., are planning the erection of a $200,000 temple.

The University of Missouri will build a school of journalism at Columbia, Mo.

The South Carolina Baptist Hospital will erect an eight-story stone and brick building at Columbia, S. C.

Bonner Springs, Kan., will erect a stone and brick school building, after plans by Smith, Rea & Lovitt, Kansas City, Mo.

A city hospital will be erected at Highland Park, Mich., costing about $300,000. The architect is M. J. Sturn, 116 South Michigan Avenue, Chicago.

Superior, Wis., will erect a $150,000 school, after plans by F. A. Johnson, of that city.

Imports of Graphite Forbidden

The restriction upon the import of plumbago or graphite has been extended by the War Trade Board, to be effective for the entire calendar year of 1918. Under the List of Restricted Imports No. 1 this restriction was made absolute until July 1 of this year, the possibility of importing not to exceed 5,000 long tons for the remainder of the year being left open should investigation prove that stocks in this country were inadequate to meet the home requirements for the entire year. As a result of the investigation, it has been found that present stocks, together with the home production, suffice to meet the home requirements until well into 1919. The restriction has therefore been continued in effect, and the Bureau of Imports has been instructed to issue no licenses for the importation of plumbago or graphite for the rest of the calendar year.

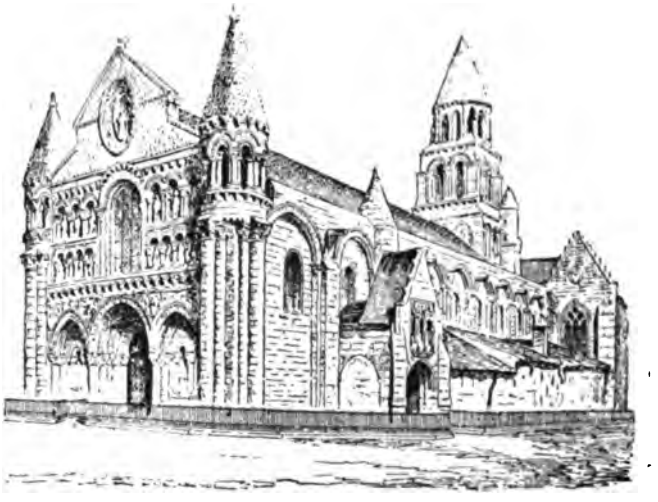
Business Embarrassments

C. Clayton Bourne and James G. Graham have been appointed receivers for John B. Rose Co., dealers in sand and gravel, at 103 Park Avenue, New York.

Trade Notes

The Sullivan Machinery Company, 122 South Michigan Avenue, Chicago, has issued a bulletin illustrating and describing the Sullivan DR-6 mounted water hammer drill. While designed primarily for drifting and tunnelling, this drill is used for a wide range of mining, quarrying and contracting work. It weighs 148 pounds, employs round, hollow drill steel, and is adapted for use on a standard column, tripod or bar. It is very powerful and is capable of rapid drilling under the most severe conditions encountered. It combines the cutting speed of the hammer type of drill with the stability and ruggedness of the older reciprocating piston machines. A copy of the bulletin can be had on application to any of the offices of the company.

On July 1 the Sullivan Machinery Company removed its Boston office from 185 Devonshire Street to Room 516, Boston Safe Deposit & Trust Company Building, 201 Devonshire Street. Mr. George E. Wolcott is the New England sales manager for the company. The Sullivan Machinery Company has established a branch office in Washington, D. C., in Room 210, Union Trust Building, corner Fifteenth and H Streets. It is in charge of Ralph T. Stone, formerly associated with the New York office of the company.



NOTRE DAME LA GRANDE, POITIERS, FRANCE

A striking example of late Norman stonework near the scene of the great English victory

Mr. A. Niedermeyer, for many years connected with the Worthington Pump & Machinery Corporation, most recently as works manager of the Snow-Holly Works of that corporation at Buffalo, N. Y., has resigned to devote his entire time to enterprises of his own.

The Ingersoll-Rand Company, 11 Broadway, New York, has issued several circulars describing the "Little David" line of pneumatic tools, suited for various uses, and the Leyner shank and bit punch for drill steel work.

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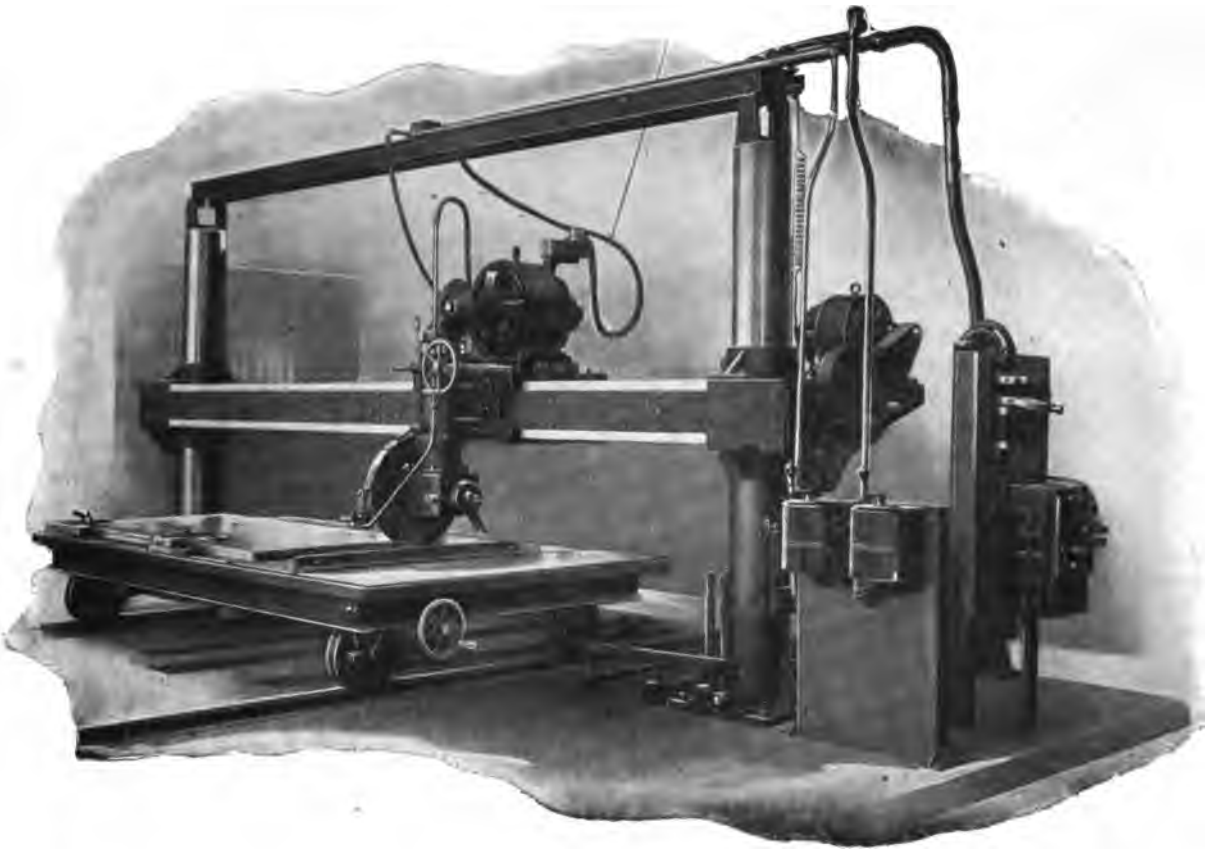

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FASTEST CUTTING MACHINE ON THE MARKET

Simplicity of Control————Highest Efficiency

Copes marble on all four sides of slab with one setting. ONLY TWO LEVERS USED; one for fast and slow table movement; one for raising and lowering carborundum wheel. HAND WHEELS for fractional adjustment of table and carborundum wheel, dispensing with helper. Machine takes up less space for capacity of table than any similar machine in the market. All foundation work level with floor

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will cut your stone faster and with less waste than any other process or machine.

They are the result of nearly 50 years of continuous manufacture and improvement.

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There are types for every grade of drilling from deep holes to plug and feather work and pop shooting.

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2—Latest pattern Patch Swing Gang Saws, steel frame, forged steel crankshaft, heavy balance wheel, very latest type throughout.

1—To saw 12 ft. long, 8 ft. wide, 7 ft. high.

1—To saw 12 ft. long, 7 ft. wide, 6 ft. high.

4—Gang Trucks.

1—Hand power Saw Punch.

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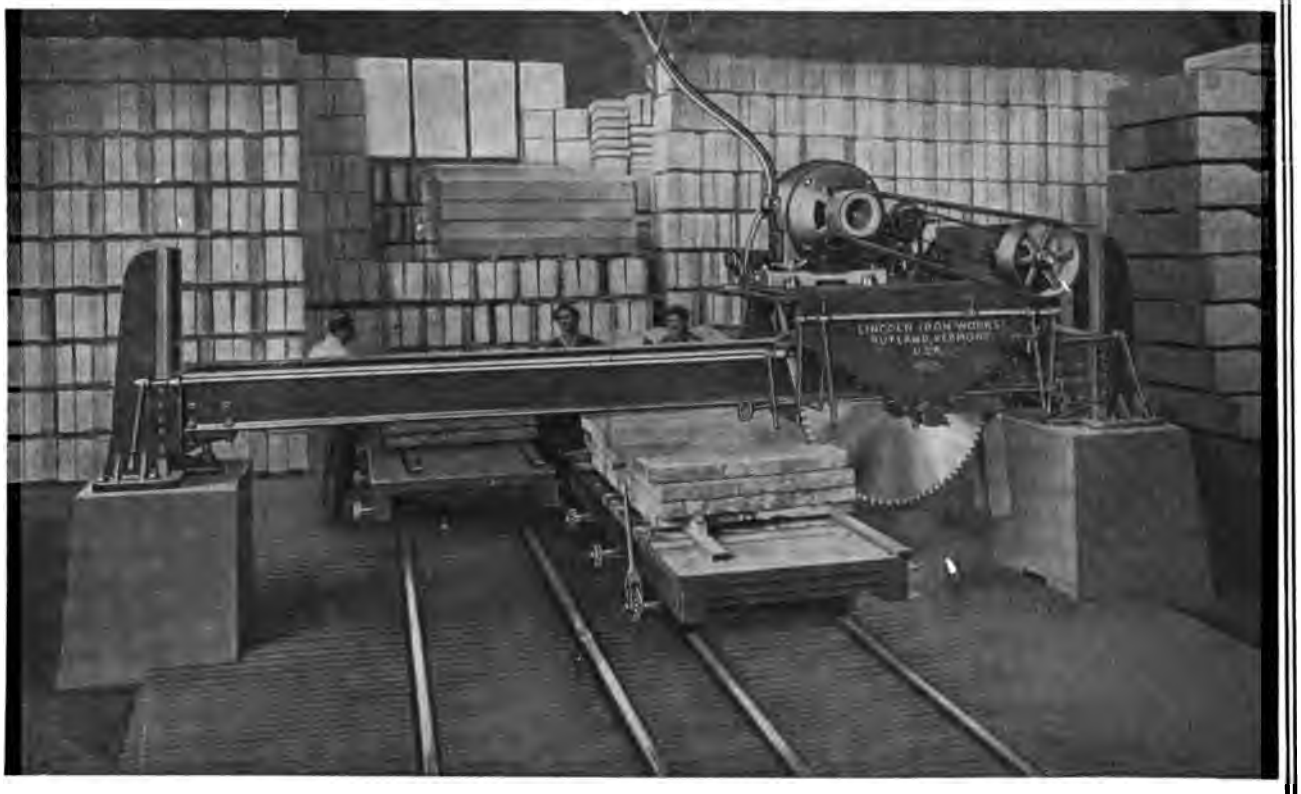

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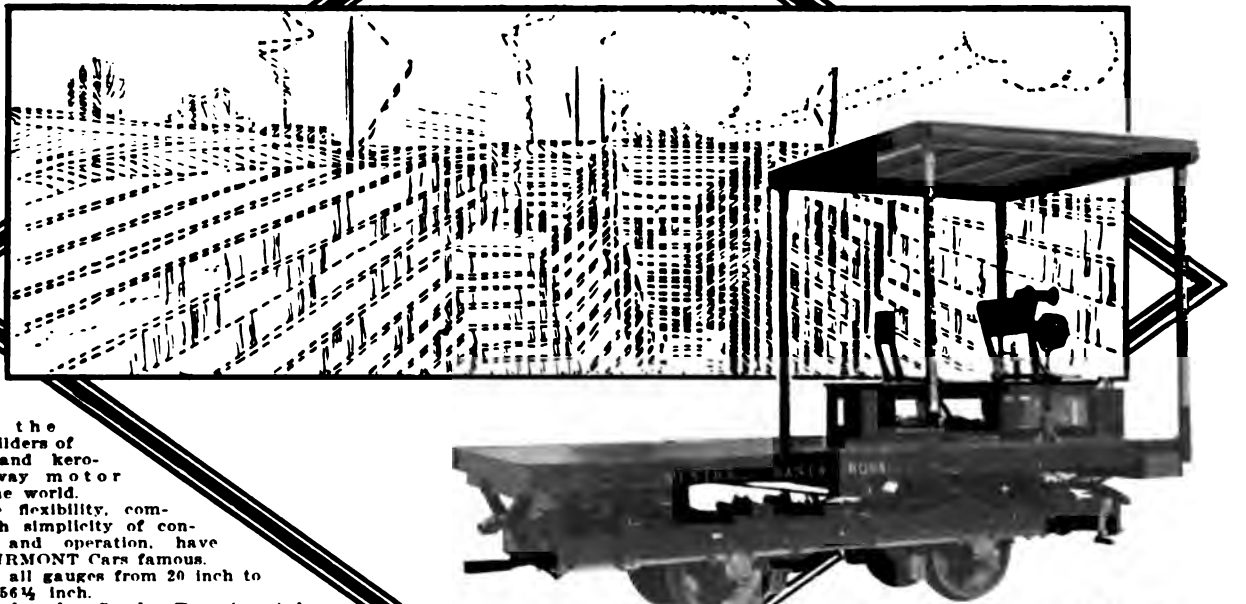

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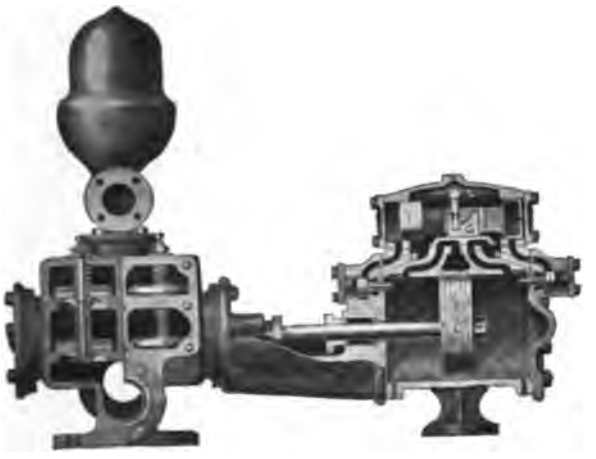

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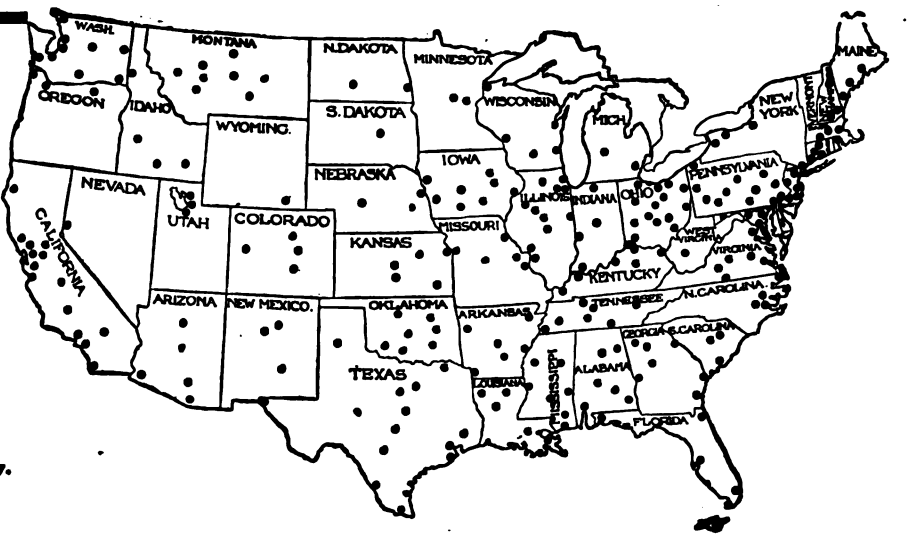

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VOLUME XXXIX JULY, 1918 No. 7

Building Revival Coming Soon

WITH the revival of building activity dependent to so large an extent upon the financial situation with regards to building loans, material and construction interests are regarding with keen interest the attitude of financial experts on building loans and are looking for the signs that may denote the beginning of a building revival.

Officers of several large financial institutions, heretofore important factors in making loans on contemplated building construction projects, concur in the opinion that the forthcoming building revival will be of gradual development, that there will be stringent control of new construction enterprises so as to avoid such conditions of demand over supply as to force building material prices to higher levels than now prevail, and incidentally to avoid anything approaching over-construction, says a New York exchange. Preference, it seems, will be given at first to structures having a purpose directly contributory to the commercial and industrial growth of this country and its allies, and speculative building construction in outlying sections of the city involving land exploitation will be delayed until more necessary construction has been provided for.

Builders may begin to look for signs of a new era of construction throughout the country in several directions, according to these authorities. The initial seed of encouragement to the careful consideration of building loan applications will come when it is apparent to financiers that the process of rolling back the enemy has reached such a point that financial interests can freely feel that there can be no retrogression. The next supporting factor will be open and official evidence that the Government's requirements for rush construction have been met to such an extent at least that general options on available building materials and supplies will not be necessary to the extent as at present exercised, so that manufacturers or jobbers supplying building supply companies, which in turn supply contractors, can be reasonably sure of making deliveries when ordered.

Still another factor determining the signs of revival in building activity will be official indication that coal can be spared for basic building material manufacture without interfering with the flow of fuel to ships of war or commerce. Still another financier thought a factor in determining the change for building and builders will be the manner in which the next and largest Liberty Loan will be subscribed. If the larger part of it is taken, as in the last loan, by the people, the effect will be much more favorable on building loan minds and will be more helpful to the builder and the building investor than will be the case if the banking and financial institutions of the country have to bear the greater part of the burden. The final factor, of course, will be complete victory.

Victory must be assured before builders can even hope for a return of normal times, said one financier, but he added: "Who expects normal times while we are at war?" Continuing, he said: "You must be very careful not to raise false hopes among the building interests at this time. Certain facts are, however, apparent to those who look for them. We must all work to win the war, and the consolation of the builder, the building investor and the real estate men throughout the country is, first, that the deprivations they are undergoing are registering mightily in France and Italy by making the money and material they would otherwise have used available for men and munitions, and, second, that they are laying up treasure into the future that will richly redound to them in interest and a building and real estate market that never would have been possible had it not been for the war.

"But the investor and the building fraternity must not expect a sharp revival of construction when the proper time comes for general building to proceed. Indiscriminate speculative building probably will not be favored as far as large lending interests are concerned. Structures having an important part to play in the country's commercial and industrial expansion will have first consideration. Under this broad classification it will be necessary to erect some apartment, office and loft buildings, tenements, hotels, terminals, warehouses, Federal buildings and some dwellings in estab-

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lished neighborhoods. Land exploitation will not be permitted to predominate in the first stage of the building movement. In the enforced withholding of building projects a demand for commercial and industrial building expansion has developed that must be met. Applications in this office alone reach to figures comparable with seven-tenths of the entire building program for Manhattan for the year 1913. The best, therefore, that can be said at present is that builders are possibly passing the deepest depression and, barring unforeseen adverse events, the upturn may fairly be considered as getting under way."

Another large lender spoke of the building future in this way: "Think first of the war that must be won. We have had to adapt ourselves as a nation to fit into unaccustomed spheres of activity and industry. We are beginning to find that we can fit and fight, and now that we are organized and operative abroad and at home it will not be long before other lines, like building and realty, will be co-ordinated so that it, too, can keep moderately active, to the end that more necessary construction work allied with commercial and industrial development may go ahead more freely."

Talc and Soapstone Output Grows

Talc is remarkable for its softness, slippery feel, and stability under a wide range of conditions, properties that make it useful for many purposes. Its soothing effect upon the skin makes it desirable for use as toilet powder, but it is most employed as a filler in paper. Much talc is used in the rubber trade, and the higher grades are employed in making electrical appliances and blanks for gas tips. The increased demands of the war have been met largely by increased domestic production. The total output in 1917, the maximum reached, was 198,613 tons, valued at $1,889,672, a gain as compared with 1916 of 3 per cent in quantity and more than 7 per cent in value, according to figures compiled by J. S. Diller, of the U. S. Geological Survey. There were 37 producers reporting to the Survey, of which 7 were in California, 6 in Georgia, 1 each in Maryland, Massachusetts, and New Jersey, 4 in New York, 6 in North Carolina, 2 in Pennsylvania, 5 in Vermont, and 4 in Virginia.

Heretofore New York has always been the first State in quantity and value of talc produced, but in 1917 its output was less than that of Vermont, although on account of the fibrous character of the talc produced in New York and its consequent high value for making paper, the total value of the output in New York is still greater than that of any other talc-producing State.

The quantity of talc imported for consumption in 1917 was less than 10 per cent of the domestic output, but a larger proportion of it is of high grade. More than half the talc imported comes from Canada and is of a grade that commands a higher price than the talc obtained from the principal domestic sources.

In its output of soapstone, which is extensively used for laboratory table tops, hoods, sinks, and laundry tubs, the United States leads the world, and most of it comes from Virginia. The resources of both talc and soapstone in the United States are large and are sufficient to supply the demand for most grades for many years to come.

California's State Building

The first stage of the competition for State buildings to be erected in Sacramento, Cal., at a cost of $3,000,000 (upon conclusion of the war) has resulted in the selection of the following eight architects, who will compete in the final stage of the competition, to be concluded September 15: Weeks & Day, Ward & Blohme and Bliss & Faville, San Francisco; Adolf Scherrer, Indianapolis; James Gamble Rogers, Dennison & Hirons and Tracy & Swartwout, New York; W. D. Hewitt, Percy Ash and N. C. Curtis, associated, Philadelphia.

Each of the above firms, besides being given an opportunity to compete for the final prize, will receive $2,500 for their efforts.

The jury of award was composed of Messrs. Henry Bacon and William M. Kendall, architects, of New York; Sylvan Schnaittacher of San Francisco; Governor W. D. Stephens; Chairman Marshall DeMotte, of the State Board of Control; State Librarian Milton Ferguson; Chief Justice F. M. Angellotti, and George B. McDougall, State Architect, the latter acting as architectural advisor.

Interest in the competition has been nation-wide. The records of the California State Architect's office show that approximately 359 architects requested information on the subject. Of this number 263 inquiries came from Eastern States and ninety-six from California. The total number of plans judged was eighty-four.

Tardy Recognition of Slate

An English newspaper says: "It is stated that the Office of Works, a Government Department, has actually dared to flout tradition in specifying for the use of Welsh slates for roofing a batch of 250 workmen's houses it contemplates building. This is a welcome indication of a change of attitude towards this deserving industry which it will be well for other departments to follow." Commenting upon this, one of the trade journals says: "The departure of the Office of Works from its customary line of action is rather remarkable, and hard to understand. If Welsh slates are worthy of being used now for roofing purposes, they were some time ago when the Office of Works appeared to have a decided prejudice against them. They were just as excellent a covering then as they are now.

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Granite Paving Block Industry

GRANITE paving blocks valued at $2,303,767, and numbering 30,978,305, were sold in 1917, according to a statement compiled under the direction of G. F. Loughlin, U. S. Geological Survey, in co-operation with the Granite Paving Block Manufacturers' Association of the United States (Inc.), and the Geological Surveys of Georgia, Maryland, Minnesota, Missouri, New York, North Carolina, Pennsylvania, Virginia, and Wisconsin. The quantity of paving blocks produced represents a decrease of 13 per cent compared with 1916, which in turn showed a decrease of more than 4 per cent compared with 1915. The value in 1917, however, owing to increase in price, was only 1 per cent less than that in 1916, which was practically the same as that of 1915. The average price per thousand during each of these three years was $48.85 in 1915, $50.73 in 1916, and $57.63 in 1917, the last being the highest price ever recorded. These figures do not include sales of "durax" blocks.

Sales were reported from 18 States in both 1916 and 1917, South Carolina replacing Delaware in 1917. Three States, Connecticut, Massachusetts and Vermont, showed increase in quantity in 1917. Maine showed a decrease of only 1 per cent. The largest decreases were in California (90 per cent), Georgia (50 per cent), Rhode Island (64 per cent), and Virginia (44 per cent).

Wisconsin continued to be the leading State in quantity sold, in spite of a considerable decrease, and was closely followed by Maine, which led in value of sales. Massachusetts, which ranked fourth in 1916, was third in 1917, displacing New Hampshire. Minnesota's sales fell below the 1,000,000 mark in 1917, and were exceeded by those of Vermont. The number of blocks made directly by producers in Vermont was not very large, but the sales of manufacturers who purchased rough blocks of Vermont granite are included, as their inclusion more truly represents the condition of the paving industry. In some granite districts of other States, blocks were made from rough stock sold by quarry companies to paving cutters, and the sales of these were included in the State totals; but in no other State was the number of these blocks so great as in Vermont.

The average price per thousand ranged from as low at $33 in Vermont and $44 in New Hampshire to $69 in Minnesota and $67 in Rhode Island. New Hampshire and Vermont showed decreases in average price per thousand of $1 and $3, respectively, in 1917. Virginia's average price remained the same as in 1916. The other States showed increases ranging from $1 in Rhode Island to $16 in California and Maine and $14 in Georgia. Notwithstanding the considerable increase in the average price in Georgia, the principal controlling factor in 1917 as in 1916 was apparently the ease with which the blocks could be prepared. Thus the average price in New Hampshire ($44) and in Georgia ($47), where easily worked granite blocks are abundantly produced, presented a contrast to that in Massachusetts ($58), where some of the granites are unusually hard, and with the average price in Wisconsin ($64) and in Minnesota ($69), where the granites are hard.

The New England States, which supplied the same general markets, sold 21,772,794 blocks, more than half the total, valued at $1,227,398, in 1917, compared with 21,764,024 blocks, valued at $1,060,538, in 1916, a gain of only 8,770 blocks, but of $166,860. This trifling gain in quantity was made in spite of the obstacles which beset the industry.

AN ARTISTIC NEW YORK ENTRANCE

Apartment House at Fifth Avenue and Seventy-fifth Street. Architects: Warren & Wetmore. Cut stone contractors: David Miller Co. Indiana limestone from the Indiana Quarries Co.

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Although a few producers reported general conditions better than in 1917, most of the larger ones, who reached distant as well as local markets, complained of shortage of labor and of transportation facilities, both by rail and water. It was also stated that some municipal improvement undertakings were postponed. Failure to make a more marked gain in 1917 was due to the abnormal conditions resulting from the war rather than to competition with other paving materials, although this factor also was of some influence. Paving blocks were shipped to many points in New England; also to New York, New Jersey and eastern Pennsylvania.

In New York, granite paving blocks were made in the Thousand Islands district, which is favorably situated with respect to markets in New York and along the Great Lakes. A large number of blocks were sold by two companies in 1917 but not so large as in 1916. The high price of blocks in 1917, caused by the high cost of operation and the increased cost of laying pavements, diminished to some extent the demand. Furthermore, the shortage of labor, boats, and cars made it difficult to supply the demand that existed. Owing to these conditions one company that was active in 1916 did not operate in 1917.

Pennsylvania and Maryland, supplying near-by though large markets, each showed a decrease of approximately 50 per cent in quantity sold. This large decrease was attributed principally to postponement of municipal improvements that had been planned.

The four Southern States—Virginia, North Carolina, South Carolina and Georgia—showed sales of 6,089,845 blocks (nearly one-sixth of the country's total), valued at $297,803 (about one-eighth of the total), in 1917, compared with 7,994,310 blocks, valued at $325,316, in 1916. The decrease in 1917 was 24 per cent in quantity but only 8 per cent in value. These States as a group supplied markets not only in the Southeastern States but in the Middle Atlantic and East Central States. The decline in sales was attributed to the high selling price and to a general curtailment of pavement laying, only absolutely necessary work being done. The price, however, was not sufficient to offset the increase in the cost of operation. Shortage of labor, fuel, and cars, as well as railroad embargoes, also reduced the output. Replacement of granite by other paving materials for all but the heaviest traffic was reported by one producer in a district where large quantities of rubble granite paving had been laid with results far below those obtained by laying well-trimmed blocks according to improved specifications.

The decline in sales in Wisconsin amounted to nearly 20 per cent in quantity and 18 per cent in value, the average price not increasing so greatly as in the districts already considered. This State supplied all its own cities as well as some cities along the Great Lakes and west of the Mississippi River. The decline was attributed to the high cost of labor and supplies and to shortage of transportation facilities.

This review shows that the decline in the sales of granite paving blocks in the eastern half of the country, which includes the principal markets, was due to temporary conditions caused by the war, which curtailed a normally increasing demand. Even in New England, where there was a slight increase in quantity, the conditions as a whole were below normal. In many cities, however, particularly in the Atlantic States, the increase in heavy traffic resulting from the war will necessitate the upkeep of granite-paved streets and the repaving with granite of streets on which other pavements have hitherto been adequate. Properly paved streets in districts of heavy freight traffic are a war necessity, and therefore a reasonable demand for granite paving blocks should be expected during the war, whereas a marked increase to compensate for the present curtailment in demand must be expected when the country is again at peace.

Only in California does the granite paving block industry appear to be more than momentarily discouraging. Producers there reported practically no demand in 1917, as brick, asphalt, and cement paving were being used almost exclusively. A considerable quantity of granite paving, however, was used in Los Angeles for repair work along gutters. No shipments to any other large cities in the Pacific Coast States were reported in 1917. These cities, when the heavy traffic around their freight terminals and in their principal business streets is considered, appear to offer a potential market for granite paving, provided the durability of granite pavements laid in accordance with the latest improved specifications can be adequately demonstrated.

Personal

Henry K. Holsman, architect, announces the removal of his office from 332 South Michigan Avenue, Chicago, to his Jackson Park studio, 1544 East Fifty-seventh Street, Chicago.

William A. Davis, of New York City, has been appointed a special agent of the United States employment service. He will visit manufacturing centers to discuss with manufacturers with war business and their associations the work of the employment service and ascertain how it may be of more help to them in finding workers. Mr. Davis has had long experience in manufacturing and organizing work. He has been a field representative of a number of employers' associations, including the National Association of Manufacturers, and was formerly secretary of the National Marble Dealers' Association.

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Sand for Building Purposes

IN builders' mortar, the sand is intended to form a bedding between the bricks or masonry, the grains being united by a cement-like compound which is formed between the sand and the lime. In concrete, the sand forms the finer portion of the aggregate, filling the interstices between the coarser particles and the sand grains are united by means of the cement.

In each case, the binding action is almost wholly confined to the surface of the grains, so that their interior is of minor importance. Consequently the shape rather than the composition of the grains of sand is important to the builder, because the shape and size will determine the extent to which the particles will interlock with each other, and this, in the presence of a relatively small amount of calcium silicate or portland cement, will form the strongest possible mass of mortar or concrete. The ideal building sand is one in which the grains, when covered with a film of slacked lime, will interlock perfectly writes Alfred B. Searle in the *Building World,* of London. Hence they should be sharp and angular rather than smooth and rounded. Of sands of similar appearance, the best has the fewest spaces between the grains.

A rough method of testing this is to weigh a biscuit tin or other convenient vessel, nearly fill it again with sand which is tapped until level and re-weigh. Water is then poured into the vessel until the sand is just completely covered. On again weighing, the amount of water which has penetrated into the pores of the sand will be ascertained, and may be calculated as a percentage of the sand used for the test. By this means the porosity or interstices of various sands may be ascertained, the sand with the lowest porosity being generally the best for building purposes.

Another useful method is to make test pieces by mixing the various sands with lime and so convert them into mortar, allow them to harden, and then grind them down to a thinness of about a thousandth of an inch. On examining these very thin slices under a microscope, it is easy to see the extent to which the grains are interlocked.

Most builders are satisfied if they are able to pass a little of the sand to be examined through their fingers. They judge by its appearance, and to some extent by the size and "feel" of the grains, and in many cases their conclusions are sufficiently correct. In several instances, however, sand has been carted a long distance simply because the clerk of the works or the builder misjudged the quality of a more accessible sand.

It is desirable to supplement what can be seen by the naked eye by the use of a powerful hand lens, as this will reveal many impurities not otherwise discernible. They may readily be distinguished from the clear and glassy quartz grains which constitute the true sand by their color and opacity.

The amount of clay or fine earth in a sand should be very small. To ascertain its exact amount is a slow and troublesome process, but a rough idea of whether a sand should be washed before use can be gained by placing a couple of ounces of sand in a tumbler of water, stirring well with a pencil or penholder, and noting the time required for the particles to settle. The clay and earthy matter will re-

JEWISH SOCIAL CENTER, WEST EIGHTY-SIXTH STREET, NEW YORK
Architect: L. A. Abramson, New York. Of dark hollow buff Indiana limestone from Consolidated Stone Company, Bedford, Ind. Michael Cohen & Co., New York, sales agent

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main suspended several minutes after the sand has settled, and some of the finest clay may not settle completely in a couple of days.

Dirty sand should not be used either for mortar or concrete, as the earthy particles tend to smear the sand grains and prevent them coming into proper contact with the lime or cement. If no mechanical washing plant is available, but water can be obtained, it is better to wash the sand in tubs or barrels by stirring it up repeatedly with water and pouring off the latter, than to use a sand which is unduly contaminated with clay or earth.

Very coarse sand is not usually so satisfactory as that of medium grade. An excessively fine sand is also objectionable. The grains should not all be the same size, as they would not furnish the requisite amount of interlocking, and would require an unnecessary amount of lime or cement.

Prizes for Small House Plans

Architects are invited to participate in a competition to solve the small house problem, same to be conducted by the Journal of the American Institute of Architects and the *Ladies Home Journal*. The latter will publish the winning solutions. Five prizes, of $1,000, $500, $250, $150 and $100, will be offered.

All treatises and plans must be sent prepaid to the office of the Journal of the American Institute of Architects, The Octagon, Washington, D. C., on or before October 31, 1918. No submissions will be accepted unless the requirements as to the three parts are fully complied with. A detailed programme will be sent on receipt of request.

The jury will be as follows: Thomas R. Kimball, president of the American Institute of Architects, chairman; Louis F. Post, assistant secretary, Department of Labor, Washington, D. C.; Thomas Adams, town planning advisor, Commission on Conservation, Ottawa, Canada; Herbert Quick, Farm Loan Board, Washington; Lawson Purdy, chairman Committee on New Industrial Towns, New York City; James Sullivan, representative of the American Federation of Labor on the Council of National Defense, Washington, D. C.; Edith Elmer Wood, legislative authority, Philadelphia; Frederick L. Ackerman, architect, New York City; Milton B. Medary, Jr., architect, Philadelphia.

Crushed Stone for Sulphite Mills

G. D. Jenssen & Company, of New York, have contracted for 80,000 tons of crushed rock from the plant of the Petoskey Portland Cement Company, just west of Petoskey, Mich. The stone is to be used in sulphite mills, in which this company is interested in various parts of the country.

Mr. G. D. Jenssen put in the sulphite plant at the Petoskey paper mill and is installing these plants in various parts of the country. The stone from the Petoskey crusher has been found well suited for the needs of these mills. The cement company is making plans to construct water shipping facilities at their plant during the coming fall and winter, so that these shipments of rock can be made by boat to the various paper mills on the Great Lakes.

Should Stock Up With Stone

For some time the argument has been put forth by the Indiana Limestone Quarrymen's Association that the trade should carry a stock of Indiana limestone either in blocks or in sawed shape, standard sizes. This because a great deal of industrial construction makes possible the use of Indiana limestone, providing it is readily available. Ready availability is assured by arranging for shipment at the convenience of the railroads and not waiting until a contract is booked or in sight, then expecting rush handling.

A case in point is the large factory building of the Grand Rapids Show Case Company, Grand Rapids, Mich., in which all the window caps and sills are Indiana limestone. This building was completed in twenty-one days. Wernette-Bradfield-Mead Company were the architects and Fred H. Hirth, of Grand Rapids, furnished the cut stone.

Immense stocks of Indiana limestone are available in the district for immediate shipment. These consist largely of stone quarried last year but to which a fair proportion of newly quarried material is being added currently.

Production of Asbestos Increasing

The asbestos industry of the United States is in better condition now than ever before, especially as to the quantity and the grade produced, and the outlook is encouraging. Most of the asbestos used in the large asbestos factories of the United States comes from Canada, but the growing appreciation of the high quality American fiber, especially that from Arizona, is a welcome feature of the industry.

The total quantity of domestic asbestos sold in 1917, according to J. S. Diller, of the United States Geological Survey, was 1,683 short tons, valued at $506,056, an increase of about 13 per cent in both quantity and value over 1916. Most of the domestic asbestos comes from Arizona, where the proportion of crude spinning fiber to that of lower grades is much larger than in Canada, so that the average price of American fiber in 1917 was $301 a ton, whereas the average price of that in Canada was only about $50.

Some years ago the opinion was expressed that as the Arizona fiber contains less iron than that mined in Canada it is therefore better adapted to use for electrical insulation than the Canadian fiber. This opinion has lately been confirmed by analyses made

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by R. E. Zimmerman, of Pittsburgh, whose investigations also indicate that the harshness of certain parts of the Arizona asbestos is due to thin films of calcite among the fibers.

A small amount of spinning fiber was mined in Fremont County, Wyo., from a contact deposit of remarkable interest.

The increased demands for asbestos due to the war have been met largely by increased imports from Canada. The imports of asbestos from South Africa and Italy have been largely cut off. The demand for imported asbestos for use in filters is being supplied by amphibole asbestos obtained from residual deposits of the crystalline rocks of Maryland.

Mica an Important War Material

Sheet mica has come to be an important war mineral through its use as an insulator in electric apparatus, especially in condensers, magnetos and spark plugs; in the windows of masks worn for defense against asphyxiating gases; and as a transparent, non-inflammable, non-shattering material, such as is needed in the windows of armored cars, in the conning towers of warships and of submarines and in automobile goggles.

The quantity of sheet mica produced and sold in the United States in 1917, according to W. T. Schaller, of the United States Geological Survey, Department of the Interior, showed an increase of 41 per cent over that sold in 1916, being 1,216,816 pounds, as compared with 865,863 pounds in 1916. No information is available to show what quantity of the domestic sheet mica produced would be suitable for any specific purpose, for the statistics include without distinction cut and uncut, clear, slightly spotted and stained, and heavily spotted and stained, as well as punch and washer mica. Sheet mica was produced in 1917 in eight States, which, grouped in the order of quantity produced, are North Carolina, New Hampshire, Virginia, South Dakota, Georgia, Alabama, Idaho and Colorado. North Carolina produced 48 per cent of the total quantity; New Hampshire ranked second, with 39 per cent. It may be said that the large producing States have done little more than hold their general average.

The prices paid for mica in 1917 continued, with minor fluctuations, to increase throughout the year. The prices paid for domestic mica in the South in 1917 were from 10 to 20 per cent higher than the prices for similar mica in 1916. The greatest increase was in the price of the smaller sizes, especially the 1½ by 2, 2 by 2, and 2 by 3 inches. The largest sizes showed no increase in price.

Melrose Abbey a Gift to the Nation

Melrose Abbey is to pass into the hands of the nation as a gift from the Duke of Buccleuch. This world-famous Border shrine was purchased for $90,000 from the sixth Earl of Haddington by Anna, Duchess of Buccleuch and Monmouth, in 1722. The Buccleuch family have taken the greatest possible care of the historic pile, and spent considerable sums upon it, previous to which it had a chequered career, and was oftimes so plundered and knocked about from motives of utility, religion and sheer wanton robbery that it is surprising it exists at all. It is one of the most interesting relics of late Gothic architecture in Scotland, and remarkable as the burial place of Alexander II, of the heart of the Bruce, of Michael Scott and many of the Douglas family. No more famous example of mediaeval British stonework is in existence.

FURNESS, WITHY & CO.'S BUILDING, WHITEHALL STREET, NEW YORK

Architect: Walter B. Chambers. Cut stone contractors: E. Shuttleworth Company. Built of No. 1 dark hollow gray Indiana limestone from the Consolidated Stone Company, Bedford

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American Marble in Porto Rico

UNTIL comparatively recent years, American architects had little experience in designing buildings specially suited for tropical climates. Then began the great development in Florida and Southern California and a little later we undertook the most extensive construction work in Panama, Cuba, Porto Rico, Hawaii and the Philippines. The Spaniards had created a characteristic style of architecture for sunny southern lands, and this was very sensibly used as the basis for our own tropical construction, with such modifications and developments as American enterprise and modes of life would suggest. It does not need to be said, however, that American architects would not be content with a mere slavish imitation. We have a "Mission style," and it is most effective in our hands, but it is by no means the same architectural style that was brought to this country in the train of the Spanish Conquistadors.

CATHOLIC CONVENT AT SAN JUAN, PORTO RICO
Designed and built by John Niggle. All the trim is Georgia Marble, bedded directly in the concrete without painting

One of the difficulties that confronts the builder in the tropic climes is the scarcity of suitable materials of construction. Wood is out of the question because the dampness of the climate rots it in a short time, and it suffers from the attacks of ants and other insects. Stone of a good quality is rarely to be had, except under transportation charges that are prohibitive. In many places there is the shell rock, coquina, that is used with good effect, but this is extremely soft, and is therefore not suitable for ornamental work that is to endure. This lack of material has given an opportunity for the use of stucco and concrete for walls. In pretentious buildings, stone would be imported for trim. In order to absorb as little of the heat as possible, white buildings are desired, and whitewash is freely used. This called for light-tinted stone for trim. Cement stains most stones, and careful waterproofing and protection was needed for cut stone set in connection with concrete.

Several years ago Mr. John Niggle took up practice in San Juan, P. R., as architect, contractor and builder. He designed a large group of buildings in that city for the Catholics, consisting of a church, school, rectory and convent. These were erected on Puerta-de-tierra Carretara in 1914-15, at a cost of a quarter of a million dollars. Naturally considerable ornamentation was required and the selection of a proper stone for trim was important. Mr. Niggle had worked in Georgia marble, and he made up his mind that this would suit his purpose, used in the way he intended. He buried a piece of the marble in concrete and left it embedded for three weeks. When taken out and brushed off, it was just as white as before, not a stain penetrating the stone. This was the material selected, and ten or twelve carloads of marble, all cut in the finishing plant in Georgia, were shipped by sailing vessel from Savannah. The Georgia marble was used for the door and window jambs, the window traceries and mullions, belt courses, corbels, etc. The backs and beds of the stones were not painted or protected in any way. The stones were simply placed in the forms and the concrete poured around them. Mr. Niggle's confidence in the marble was fully justified, as the buildings are today white and absolutely free from stains. This non-staining quality of Georgia marble is generally recognized. The government specifications for the post office at Morristown, N. J., finished in 1917, called for the coating with waterproof paint of the backs, beds and joints of all stone, "except Georgia marble."

Mr. Niggle first designed the church in Mission style, but it was not effective in so large a building, so he changed to the Romanesque. The sand for the entire job was taken from the ocean, dried and used in

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the concrete. This is not the usual practice in the island, but it gave good results. Mr. Niggle also built a small church in the Mission style at Miramar, P. R. These Porto Rican buildings have an interest from the fact that they are probably the first ones in which a delicate tinted stone has been bedded directly in concrete without any protection.

Patriotism and Slate Roofs

The great scarcity of natural slate and of galvanized roofing iron in Queensland has reminded the colonists of the utilization of hardwood shingles for roofing purposes that was once made there, says the *Slate Trade Gazette*, of England. But where galvanized iron has been used, its durability, or rather lack of it, has been found very unsatisfactory. Bearing on the question of shingles, a large poster is being displayed throughout the United States asking people to do all they can to prevent fires, which are a source of vast destruction of life and property. It is headed: "A patriotic duty of every American is to prevent fire. America at war needs every ounce of her energy and resources. It is criminal to cause hazards; it is unpatriotic to neglect them." Then follow a few hints. The poster winds up with the adjuration: "Help Uncle Sam, be careful."

How is it that our Allies are victimized to such an enormous extent by fires? Undoubtedly the primary cause is the use of inflammable roofs such as shingles, asphalt, tarred felt and composition roofings containing inflammable bases. It would, perhaps, have been better to have taken the bull by the horns some years ago and compelled householders, in their own if not the national interest, to have had a non-inflammable covering like slate. One can understand the colonists of Queensland falling back on shingles, for theirs is a case of Hobson's choice. They can get nothing else. Not so with America, where there is an abundance of good quality slate. Prevention is better than cure, and if Uncle Sam put his foot down he could reduce his big fire bill materially. A land of shingle roofs must always be a land of fires.

Mica Schist for Furnace Linings

Mica schist is one of the commonest kinds of metamorphic rock and consists essentially of mica and quartz, with which may be associated certain other minerals, such as garnet and staurolite. Owing to its marked foliation, its softness, and its generally unattractive appearance, it has not been greatly used as structural stone or as paving or crushed stone. It was once quarried near Bolton, Conn., for use as flagstone, but it was too soft to withstand the wear upon it in places of much travel.

The mica, to which the softness of mica schist is due, however, successfully withstands a very high temperature, and as the stone can be readily cut into blocks of the desired shape, mica schist has therefore been used considerably as furnace lining. The mica schist quarried for this use is found in eastern Pennsylvania, at places conveniently near the metallurgical plants in which it is required. The quantity of mica schist produced for this purpose in 1917 was 39,975 short tons, an increase of 6,739 tons, or 20 per cent, over 1916, according to statistics compiled by G. F. Loughlin, of the United States Geological Survey. The value of the output in 1917 was $85,986, an increase of $38,682, or nearly 82 per cent. The greater increase in value was due to a rise in price from $1.42 to $2.15 a ton, which largely represents the increased cost of production.

CATHOLIC CHURCH IN SAN JUAN, PORTO RICO
Designed and built by John Niggle. The trim is entirely of white Georgia marble, bedded in concrete

Artificial Marble in Denmark

A new limited company has been formed, with a capital of 300,000 crowns ($80,400 at normal exchange), for the utilization of a Danish patent for making artificial marble—a stonelike mass, which may be molded and which will stand exposure to wind and weather, writes Commercial Agent Norman L. Anderson, from Copenhagen. It may be molded with a smooth surface, so that the expensive polishing process is avoided. Experiments have shown it to be fully as hard and strong as real marble and other similar stone.

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Sawing and Working Sandstone

ALTHOUGH much block sandstone is sold to dealers in large centers of population, nearly all quarries that produce stone for building uses, or for grindstones, curbing, or flagging, with the exception of the bluestone quarries, have mills or finishing plants connected with them. The combination of sawing or otherwise finishing with quarrying has certain definite advantages. The quarryman understands his rock, he knows its peculiarities and defects, and knows how it should best be worked in order to minimize its weakness, writes Oliver Bowles in "Sandstone Quarrying in the United States." By sawing in accordance with unsoundness, or in such a manner as to give the best surfaces possible on blocks of stone containing defects of coloring or composition, the proportion of waste is much lower, and the serviceable stone may possibly be placed in a higher grade, than when the blocks are sawed without regard for such structures. Furthermore, the finishing of the stone in the vicinity of the quarry removes the necessity of paying transportation charges on the material that is wasted in manufacture.

Where possible, mills or other finishing plants should be placed convenient to the quarry. In some cases blocks are loaded directly on gang cars by the quarry derricks. For a quarry situated at a high elevation it may seem advantageous to place the finishing plant at the foot of the hill, as at Sherrodsville, Ohio. In certain other quarries situated at high levels—as, for example, those near Empire, Ohio—finishing is done at the quarry level and the finished product is transported to the foot of the hill by cable cars.

The situation of such plants depends also on the source of power and the situation of the power plant. It is wise to place the plant where it demands a minimum transformation of power from one form to another. Thus, if water power is available, connecting the turbines directly with the mill is simpler and much less expensive in first cost and maintenance than transforming the water power into electric power and driving the mill by electricity. If other circumstances permit, the mill should, therefore, be placed where such direct connection is possible. If electric generation is necessary for other purposes, it may, however, be advisable to use electricity for driving the mill also, and under such conditions its situation will be governed by other factors.

Water, steam and electric power are employed to operate saw gangs. Direct water power is simple and requires less expensive equipment than hydroelectric power. Direct steam power is employed in few places, as usually electricity is required for quarry operations, and therefore an electric generating plant is necessary. Electric power is applied to saw gangs in a variety of ways. In some mills individual motors are used for each gang, and in others one motor drives a group of 6 to 12 gangs. In the latter case a gang may be stopped by shifting the belt to an idle pulley. Certain advantages and disadvantages of the two methods may be enumerated. The use of individual motors makes easy the repair of motors without tying up the entire mill. On the other hand, the first cost of 10 individual motors is greater than the cost of 1 motor of sufficient size to drive 10 gangs. Moreover, the most economical speed of a small motor is higher than that of a large motor, and as gangs are operated with a relatively slow motion a greater reduction in speed is required for the individual motors than for the single motor of larger size. The greater the reduction in speed that is demanded the greater are the losses through friction and wear. Where individual motors are used, the crank shaft of the gang may be gear driven or belt driven. It is claimed that the vibration and jarring of gears has an injurious effect on motors and that on this account belts are to be preferred.

Gang frames are of various widths and lengths, depending on the sizes of the blocks sawed. Gangs in a single mill may be of various widths to accommodate blocks suitable for different purposes. Where there is great variation in the length of the stock, gang frames of different lengths are required. A sliding head has lately been devised which permits adjustment of a gang frame for length. Two types of gangs are in common use, the rope-feed and the screw-feed. The rope-feed gang is suspended by means of steel cables attached to counterbalance weights. The weights may be adjusted in such a manner that the gangs are allowed to exert any desired downward pressure of the saws on the rock. Thus a constant pressure may be maintained, and the rate of cutting will be governed by the hardness of the rock. If a hard, flinty mass is encountered, the rate of sawing is appreciably reduced until the obstruction is cut through. Screw-feed gangs are fed downward by gears, and, although the rate of downward motion may be regulated, the device is not self-adjusting. If a flinty mass is encountered, the rate of sawing is not automatically reduced, and if the saw is overcrowded, the blade is inclined to run to one side, with consequent production of an uneven rock surface. The screw feed is employed on nearly all modern gangs.

It is important that all bearings be properly capped to keep them sand-proof. Any looseness occasioned by wear should be taken up so that the shafts run in the bearings without play. Inefficient service is rendered if saw blades do not run true. The fault may be in the play of the shafts in the bearings or in improper setting of the blades. With improper adjustment of gang bearings or blades a side motion may accompany the backward-and-forward motion of a blade, and as a result the saw cut may be two or three times

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as wide as it should be, obviously involving waste of power, time, steel and rock.

When, in the course of sawing, the blades approach the bottom of the block there is danger of the lower edge of the block chipping off. If the lower face of the block is a sawed surface, the chipping off of edges may seriously mar the finished product. A simple device introduced by one Ohio company prevents such chipping of the edges. One end of the block is raised one or two inches higher than the other end, so that the saw reaches the bottom of the block at one end before it reaches the bottom at the other end. With such an arrangement the blade intersects the lower face at a long angle and the danger of chipping the edges is minimized.

Sharp sand is used commonly as abrasive in sawing. It leaves a smooth surface and causes no staining of the rock. Although crushed steel or steel shot cut 25 to 50 per cent faster than sand under similar circumstances, there are some disadvantages in their use. They leave a much rougher surface than sand, and if the rock is to be used for structural purposes the surface must be sand-rubbed, whereas if sand alone is used as abrasive this process may be omitted. If the rock is porous, there is danger of stains resulting from iron rust; this is overcome to some extent by mixing lime with the steel. Where the stone is to be used for such purposes as curbing and flagging a steel abrasive is very satisfactory. A mixture of sand and steel is commonly used.

In a Michigan quarry some years ago steel shot were crushed into soft iron blades by passing them between rolls, and thus a saw was produced with the abrasive contained within it. No information has been obtained of the success of the experiment, but the suggestion may be of value. One Ohio company tried carborundum powder as abrasive, and by this means increased the rate of sawing from 6 inches to 26 inches per hour. At first the method appeared to be an unqualified success, but it was soon found that the carborundum powder was rapidly pulverized to a condition of fineness that rendered it ineffective. Thus, although the rate of sawing is high, the cost of the abrasive is also high.

Centrifugal sand pumps are in common use for elevation of the abrasive to a point above the gangs, from which it may be distributed to the saws for repeated use. When the concrete bed beneath the gang is too flat, difficulty is sometimes experienced in getting the crushed steel back to the pump well for elevation. A device employed by one millman to assist movement of the steel is a belt made of discarded belting and provided with crossbars, by which the steel is carried back to the pump well.

An air lift is now employed successfully in a number of places. For raising sand in water, a well of sufficient depth is required to have about one and one-half times as much pipe submerged as above the water level. A jet of compressed air enters at the bottom, which agitates and aerates the water, causing it to rise in the pipe. The successful use of an air lift with crushed steel has not yet been demonstrated so far as is known. It is evident that a greater volume of air and more agitation would be necessary on account of the steel having a higher specific gravity than the sand. The great advantage of the air lift consists in its simplicity and the absence of moving or rotating parts, which are rapidly worn out by sand and specially by crushed steel. At some mills no pumps are employed, the abrasive being shoveled on by hand. Where river sand is obtained near by, it is commonly allowed to escape after one use.

The rate at which saws sink through sandstone blocks depend on a number of factors, such as length and number of blades, kind of abrasive used and hardness of the stone. Where gangs contain 10 to 15 blades and are employed in sawing average sandstone blocks 5 to 7 feet long, they sink at the rate of 3 to 8 inches per hour when sand is used and 6 to 12 inches

A North Carolina Granite Quarry
View in one of the quarries of Balfour Pink Granite of the Harris Granite Company at Salisbury

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per hour when steel is used. The rate is governed also by the nature of the product. In rough material, such as curbing, saws may be crowded to their maximum capacity, but when building blocks are being sawed such crowding is not permissible, as it may produce irregularities on the surface. The more indurated sandstones or quartzites can not be sawed profitably on account of their extreme hardness. When an attempt was made to saw the White Haven, Pa., quartzite parallel with the bedding, the saws would run in the softer reeds and then bind.

Gang cars, which take the place of the old-fashioned timber saw beds, are employed almost universally in sandstone sawmills. Transfer cars are used at Berea, Ohio; at some of the mills at Amherst, Ohio; at Fulton, Ohio; at Eagle Harbor, N. Y.; and at a number of other places. At some mills, where efficient service is rendered by derricks or traveling cranes, transfer cars are not employed. The writer is convinced, however, that the transfer car is an advantage in any case, as otherwise the gang is kept in idleness during the time of unloading and reloading the gang car. One company in Ohio found that the installation of a transfer-car system reduced the time during which the gangs were idle to one-third of what it was before the system was introduced. Derricks are employed for loading and unloading at this quarry. At one sandstone plant in Ohio a railway siding to the quarry passes in front of the mill and is utilized for a transfer-car track. During the time when railway cars are being moved on the siding the transfer car is removed from the track with a derrick. For most small mills, derricks are employed for loading gang cars. At the large mills overhead traveling cranes are found to give the most efficient service. They may be extended to serve adjoining mills, storage yards, etc.

For making third and subsequent cuts, saws other than gang saws are commonly used. Diamond saws have been tried in some Ohio sandstones, but have given poor service. Circular saws with carborundum teeth have given satisfactory service even in sandstones indurated sufficiently to make feasible their use as paving stones. A blade mounted with diamond teeth and set in a straight-cut gang frame is used to some extent.

Plants that are equipped for the production of building stone require rubbing beds, as many structural blocks require sand rubbing in order to give them smooth, even surfaces. Where sand is used as an abrasive in sawing, the resulting surface is commonly so smooth that bed rubbing is unnecessary. Where steel is used, however, the irregularities on the surface must be removed.

A simple device is employed by a Pennsylvania company for returning sand to rubbing beds. A 2-inch iron pipe is set in bearings, with one end over the rubbing bed, and is rotated slowly by means of a belt on a pulley. It is nearly horizontal, though slightly lower at the end toward the bed. At the opposite end is a second pipe about 3 feet long projecting at right angles The latter pipe is curved at the outer end in the direction of revolution, and as it revolves it dips into a trough into which sand and water drain from the bed. As the pipe revolves, the sand and water entering it run down through the rotating axis and are thus returned to the bed.

Exterior of Toronto Station Completed

The final stone for the completion of the exterior walls of the new Terminal Station at Toronto, Can., was laid on May 27. This is the largest and most complete union station north of the Canadian border. It is built by the Toronto Terminal Railway Company, comprising the Canadian Pacific and Grand Trunk Railway Companies. The architects of this structure are Messrs. Ross & Macdonald and Mr. Hugh G. Jones, of Montreal. The general contractors are the P. Lyall & Sons Construction Company, of Montreal, and the cut stone contractors are George Oakley & Son, Limited, of Toronto. The general style of the building is in Roman classical architecture, with plain and simple wall surfaces, sparing in ornament. This was probably the largest single contract for cut stone work ever awarded in the Dominion of Canada, and what is more, it has been completed in record time, notwithstanding the shortage of labor due to war conditions. With the exception of about 15,000 cubic feet of Queenston stone, from quarries at Queenston, Can., used in the base, the walls of the building are of Indiana limestone, furnished by the Indiana Quarries Company, of Bedford, Ind. About 200,000 cubic feet of this stone was required for the job. It was shipped in the rough, and was cut and finish at Sarnia, Can., where a special plant was erected for the purpose. The interior is being finished in a pink limestone from Minnesota, which is found to harmonize well with the general color scheme adopted for the building.

Mr. George Oakley, Jr., the general manager for the cut stone contractors, is naturally greatly gratified that it was possible to complete the exterior work in even less time than was anticipated. The severity of the weather the past winter made the setting of stone very difficult, but the entire 200,000 cubic feet was finished and in place within fifteen months.

Judgment Against a Sculptor

Property at Stone Mountain, Ga., of Gutzon Borglum, the sculptor, who recently made sensational charges in connection with the aircraft production program, has been advertised for sale at public auction to satisfy a claim of C. G. Baxter, ex-secretary to the sculptor, for $700 back salary. The property consists of equipment used by Borglum in carving a memorial to the Southern Confederacy on the face of Stone Mountain.

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STONE

A MONTHLY PUBLICATION DEVOTED TO THE STONE INDUSTRY IN ALL OF ITS BRANCHES

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VOL. XXXIX JULY, 1918 No. 7

ACCORDING to newspaper accounts, impressive ceremonies marked the blessing of a "beautiful new imitation marble altar" in a Catholic church at South Bend, Ind. We must confess that we deprecate the attitude of mind that will use any imitations in the service of religion. Plaster or wood are good honest materials in themselves, but why should an effort be made to simulate a rare and costly stone? The altar is purely for the glory of the Lord. We ask, in all reverence, is there any idea that He cannot distinguish the true from the sham?

THE fear of a fuel shortage next winter has by no means been allayed. In some of the quarrying centers the shortage has already been felt, and has caused the curtailment of work. The conservation of fuel becomes a most important question in every line of industry. The present high rate of coal production is still insufficient to supply all needs and there seems to be no possibility of an increase in the output of the mines sufficient to satisfy every demand. There are two possible results of this fuel shortage; either certain industries must close down or more work must be done with the coal available. The Engineering Experiment Station of the University of Illinois has just issued a 90-page booklet printed in four colors which shows that the average small power plant can save 15 per cent of its fuel by the exercise of greater care in equipment and operation. This means a saving of twelve or thirteen million tons per annum if applied throughout the country. The purpose of the publication, the title of which is "'Fuel Economy in the Operation of Hand Fired Power Plants," is to present to owners, managers, superintendents, engineers and firemen certain suggestions which will help them in effecting greater fuel economy, and in determining the properties and characteristics of the coal purchased. Features of installation essential to the proper combustion of fuel are discussed, the practice to be observed in the operation of the plant is outlined; and the employment of simple devices for indicating conditions of operation is prescribed. It would be well for the stone industry to make a close study of this matter, and be assured that it has availed itself of every possible economy in coal consumption.

THE General Order No. 282 by the Central District Freight Committee, which calls for an increase on switching charges, if allowed to stand will practically stop operations in the Bedford and Bloomington stone district. Protests have been lodged with the committee and several conferences between the stone operators of the district and the proper officials have been held in Bedford and Chicago. The Bedford Chamber of Commerce has taken this matter up with Senators New and Watson and Representatives Cox and Bland with the view to securing co-operation. The freight rate advances recently inaugurated at first looked good, that is, when it was understood that the line haul rates would be advanced only 2 cents per hundred instead of 25 per cent. as applied to most all other commodities. It developed later, however, that increases would go in effect (which they did June 25th) which materially augment the cost of handling the material at the source, that is, within the quarries and throughout the district generally. The fact of the matter is that these switching increases range in the neighborhood of 1,000 per cent., although a hearing has been set and the likelihood is a material reduction will be made in these switching charges. It must be taken for granted, however, that the net result nevertheless will be a substantial addition to the cost of production of Indiana limestone. Communication with other quarry districts indicates that much the same situation exists there so that clearly considerable effort will have to be put forth by many interests in order to bring about a reasonable adjustment. It has also been found necessary to advance wages by a substantial amount, the average being computed at about 17 per cent. This is the third wage advance within a little more than a year and apparently barely has the effect of holding labor in the district. Previous wage advances were August 16, 1917, and March 19, 1917.

AS USUAL when concrete is concerned in any way, there were many people ready to hail the beginning of a new era when the United States Government started the building of concrete ships. We were told not only that these could be constructed at less cost and with greater speed than steel or wooden ships, but also that they could defy torpedoes and mines, and would be practically everlasting. All other types of vessels would eventually be discarded in favor of "poured" ships, and the Government was urged to spend its

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greatest efforts in ship building along this line. Now comes the awakening. The ships are just as vulnerable to attack as any other, and they are not expected to last long. An editorial in the New York *Evening Post* says: "The authoritative statement made at Atlantic City on Saturday that the Government does not believe that the concrete ships it has contracted for will surely last more than a year, is astounding indeed. No less than $42,000,000 has been set aside for vessels made of this material, yet the chief engineer of the concrete division of the Shipping Board, Mr. J. R. Wigg, declared, in speaking before the American Concrete Institute: 'They are expected to disintegrate. All that we are counting upon now is that they will last at least one and probably three years.' Structurally, he said, they were all that could be desired, and the first one, the Faith, had stood a severe trial, but they were, he insisted, merely emergency ships and the Government will apparently be quite content if it has them in full service for a twelvemonth. This is rather startling news, and will undoubtedly give rise to a warm discussion by the proponents of the concrete type. If what Mr. Wigg says is true—or even extending to five years the possible life of the ship—there is plainly no post-bellum career for this revolutionary method of construction." At a meeting of the American Society of Civil Engineers, Mr. Wigg also said that the concrete ship will be no more nearly proof against submarine attacks than steel vessels of a similar size. "The concrete ship," said Mr. Wigg, "should not act differently from the wooden or steel vessel. It has a very thin hull and if a torpedo tears a hole in it, it will sink. It will be no different in this respect from the ordinary ship. But in the 7,500-ton vessels we are building, a torpedo can pierce two compartments without causing them to sink. The concrete ship is structurally equal to a steel ship and is really a better vessel structurally. But we are not sure how long they will last. The ships of this kind which are now being launched naturally have some faults, but these will gradually be corrected. Corrosion of the metal and the cracking of the concrete are the two chief things to be guarded against in the concrete ship. The vibration of a concrete vessel has been shown, by experiment, to be about one-third that of a steel ship."

Builders to Help in the War

A conference of representatives of the building industries of New York was held the past month. The keynote of the meeting was that "the industries must be adjusted to the Government, and not the Government to the industries." The sentiment was expressed that in the past the various organizations represented in the building industries had been obliged to act singly in matters affecting their particular interests, and that now the time had arrived when unified effort should be made in order that the best results might be accomplished. A committee was appointed, representing various building interests of the country, to formulate and complete plans for a national organization, including the material, engineering, architectural and contracting industries. It is the purpose of the organizers to co-ordinate the building industries on a basis that would place them more easily at the disposal of the Government during the period of the war. With this object, Building Industries of New York has been formed.

In a recent statement the president of Building Industries, Roland Taylor, of the Building Trades Employers' Association, said: "Aside from the tremendous value of the work which this association is accomplishing during the war, its value to the Nation, to the city and to the building industry will be perhaps of equal importance during the reconstruction period when war ceases and peace returns. In submitting constructive suggestions to officials at Washington at their request, we pledge our organization to act for the best interests of this Nation in the successful prosecution of this war, which should be the first consideration of every patriotic citizen regardless of personal or local interest. This will be the policy of Building Industries. When war ceases we will strive with equal earnestness for the rehabilitation of the building industry of New York and of the Nation, which represents several billions of fixed capital, including 5,000 architects, 200 to 300 building exchanges, 100 or more national associations, 1,500,000 workers, all of whom are seeing day by day more clearly the value of practical constructive co-operation, intelligent foresight and timely action."

Motor Trucks in Stone Service

The disinclination of motor truck drivers to handle vehicles with which trailers are used, because of the extra work involved, is a handicap to the employment of trailers. A solution of this difficulty has been offered by E. C. Dunbar, manager of the Dunbar Stone Company, of River Rouge, Mich. He calls it a "trailer bonus plan" and describes it as follows:

"We have achieved very satisfactory results from the use of a simple bonus for the use of trailers. The drivers liable to call for trailer service are paid so much extra per hour through the month; they are in a class a little above the men hauling with the regular trucks, as they carry a helper and the others do not. In addition, every time a driver goes out with a trailer he gets a brass check. These checks he accumulates until pay day, when he turns them in and gets a certain amount of money for each in a separate check.

"There is encouragement for experiment with trailer drivers in the facts that the National Standard Cost System will put into the manufacturers' hands. The cost and operating forms themselves

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have space provided for recording the number of trailers, for the mileage over which they are used and for the number of tons they carry. The daily service record or driver's record provides similar spaces."

Building Outlook More Hopeful

"The government has at last made clear that it does not desire, and has never desired, to put a stop to necessary building construction," said N. F. Hoggson, president of Hoggson Brothers, builders, to a New York reporter recently. "The individual or corporation confronted with a building problem need only answer one question—'Is the building essential?'

"Secretary McAdoo has stated in unequivocal terms in a letter to Senator Calder, which forms a part of the Senate records, that 'there has never been any suggestion that buildings actually needed for the health and protection of the civil population, or for the conduct of essential business of the country, should not be constructed during the period of the war.' A great number of contemplated necessary building operations have been postponed because of an erroneous interpretation of the government's wishes. These should now go ahead.

"There has been every reason for the average person to believe that the attitude of the government was against building now. 'Economy-at-all-costs' advocates have spread the 'no building' idea to the point where to build during the war would amount almost to disloyalty.

"A committee of the Indiana Limestone Quarrymen's Association recently waited on Mr. McAdoo and made clear to him that his stand on the building proposition had been misunderstood. It was suggested that a new, clean-cut statement from him to the effect that the government meant to pursue a constructive policy would serve to dispel the fog of misapprehension. The secretary replied to the suggestion that in view of previous statements to the public on the subject, and the apparent misunderstanding which has arisen through them, further utterance would only serve to thicken the fog.

"Mr. McAdoo's letter to Senator Calder now makes it clear that the government does not regard all private building as non-essential."

Housing Problem in Germany

The United States Department of Labor has compiled an account of the housing conditions in Germany, which is taken from official German reports. Building has practically ceased in the great German cities, states this report. Only one-ninth as many houses were built in 1916 as in 1912, and the houses are much smaller. The total number of houses erected in the 45 largest cities in Germany was only 1,009 during 1916, and still less in 1917. The total number of houses erected in all Germany was much less than the number built in any one of a dozen American cities. In such cities as Berlin, Hamburg and Frankfort, building has long since ceased. Only in the great war industrial towns is there any construction of any kind. It is in these latter towns, such as Essen and Kiel, that there is any present shortage of houses. The war has depleted the population of Berlin and Hamburg so that they do not suffer even though they have less and poorer accommodation than formerly. So Germany has the spectacle of industrial towns packed to the point of discomfort, while her great cities are but partly filled. In Aix la Chapelle one house in 12 is idle; in Barmen, one in 15; in Berlin, one in 16; in Hamburg, which with its shipping and export trade was a rapidly-expanding hive of industry before the war, over 6 per cent. of the houses are absolutely vacant; in Bonn, 4 per cent. are idle; in Frankfrot on the Main, 5.3 per cent. No new houses are built and the old ones wear out, but the population is being depleted faster than the houses. But while the cities stagnate workmen are packed in the great munition cities. Less than 1 per cent. of the dwellings are idle in eight of the cities where war industries thrive. Among these cities are Essen, Erfut, Kiel, Lubeck, Stettin, Brandenburg, Konigsberg and Madgeburg. Conditions at Kiel are particularly deplorable. Only one house in 500 is vacant, and the number of uninhabitable places is normally higher than this.

Substantial Buildings in Los Angeles

After making a trip through the East, J. J. Backus, chief inspector of buildings in Los Angeles, Cal., submitted a report to the Board of Public Works, in which he declared that Los Angeles was as good as or better than any other city in the matter of first-class construction. The materials used are very largely stone, brick and hollow tile. Then he adds the following: "For the much talked of concrete house I find that very few such buildings are being erected and that nothing of this character which is not of undisputed stability is allowed to be erected."

Compressed Air Definitions

Upon the recommendation of its technical committee the Compressed Air Society has adopted the following definitions of certain compressed air terms in order to eliminate confusion as to their exact meaning:

Displacement—The displacement of an air compressor is the volume displacement by the net area of the compressor piston.

Capacity—The capacity should be expressed in cubic feet per minute and is the actual amount of air compressed and delivered, expressed in free air at intake temperature and at the pressure of dry air at the suction.

Volumetric Efficiency— Volumetric efficiency is the ratio of the capacity to the displacement of the compressor, all as defined above.

Compression Efficiency—Compression efficiency is the ratio of the work required to compress isothermally all the air de-

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livered by an air compressor to the work actually done within the compressor cylinder as shown by indicator cards, and may be expressed as the product of the volumetric efficiency. (The intake pressure and the hyperbolic logarithm of the ratio of compression), all divided by the indicated mean effective pressure within the air cylinder or cylinders.

Mechanical Efficiency—Mechanical efficiency is the ratio of the air indicated horse-power to the steam indicated horse-

THE STARGARD GATE, NEW BRANDENBURG
An interesting example of early Prussian stonework on the Haval, near Berlin

power in the case of a steam driven, and to the brake horse-power in the case of a power driven machine.

Overall Efficiency—Overall efficiency is the product of the compression efficiency and the mechanical efficiency.

The society further recommends that the use of other expressions of efficiency be discontinued.

Peculiar Fatality in a Quarry

A peculiar accident caused the death of a laborer in a rock quarry at Rochester, N. Y. The man was on top of a chute, pushing stone down into a car loaded by his companions, when he lost his footing and fell. He retained his hold on his shovel and the tool caught the sides of the chute and held him, while tons of rock fell on him.

Building Activity in Principal Cities

Building operations in New York State were very limited for April, 1918, amounting to a total of $8,500,000 for the first and second-class cities, as contrasted with $14,000,000, $21,000,000 and $23,000,000 of work reported for April of 1917, 1916 and 1915, respectively. This inactivity in construction work is the result of the Government's determination that nothing shall be undertaken except that which is absolutely necessary for war needs. Aside from such discouragement, a naturally deterring factor is the high price of building material and labor.

Accidents on the Job

Do not fail to give attention to a wound, even if very slight, says a Red Cross leaflet.

If proper first aid is not available it is safer to expose the wound to the open air than to cover it with unsterilized cloth.

Cut or pull clothing away from a wound.

Never insert anything in a wound and never wash a wound with water.

A wound should be treated with one-half strength tincture of iodine, which should also be applied for an inch around the edges of the wound.

Fractured bones should be properly secured in place before the patient is moved.

Watch for the nervous effect of shock, and treat it by lowering the head, loosening the clothing and keeping the patient warm and quiet.

Marble and Granite

The big crane in the plant of the Vermont Marble Company in Tacoma, Wash., is proving very useful for installing boilers in the Emergency Fleet steamers built by the Seaborn Shipbuilding Company, of that city.

The contract for a new floor in the post office at Watervliet, N. Y., has been awarded to the Conroy Marble & Tile Company, of Troy.

According to the report of the Georgia Commissioner of Commerce and Labor, the marble and granite quarries and marble yards in that State show 112 plants, capitalized at $4,150,000, using raw materials valued at $1,114,000 and manufacturing all classes of marble and stone products, valued at $3,652,000. The average daily number of wage earners is 3,000, and they received for 1917 $1,540,000, the officers and clerks receiving $145,600.

Peter Cleary, 115 Marion Street, Brooklyn, has been awarded the contract for remodelling the exits and installing a marble wainscot in St. Teresa's Church, Sterling Place and Classon Avenue, Brooklyn.

The Eureka Marble & Tile Works have installed a complete plant at Columbus, O., and will do a general business in marble, tile and slate. Philip McDonough, a well-know marble man of the Middle West, is the general manager.

A new marble floor has just been installed in the vestibule of the Synagogue of Baith Israel Anshei Emes, on Harrison Street, Brooklyn. It was a gift from the Jewish Circle.

The new $200,000 St. Coleman's Catholic Church in West Sixty-fifth Street, Cleveland, has just been dedicated. It is in the Romanesque style of architecture. The majority of the parishers are of Irish birth, and all of the altars and other marble finishings are of Carrara marble, cut by craftsmen in Dublin.

T. L. Watson & Company, bankers, of Bridgeport, Conn., will erect a new two-story granite banking building on John and Main streets, in that city.

Tonella & Sons, of Milford, N. H., are cutting and shipping about eighty granite blocks for the Wolcott Memorial, which is to be erected in Lake Park, Milwaukee, in honor of the city's dead soldiers and sailors.

The new hospital of the Cleveland-Cliffs Iron Company, at Ishpeming, Mich., is to be finished on the interior with marble from the Michigan Verde Antique Marble Company, whose quarries are near Ishpeming. Large blocks of the marble are now in the city, ready for sawing, polishing and cutting. The marble will have to be sent away to be finished, as there is no mill at present in Ishpeming, although the establishment of one is contemplated. The work of building the spur track to the quarries has not yet been completed, owing to the difficulty in securing labor.

The War Trade Board, under date of June 20, announces that it will consider, among other commodities for exportation to European Holland and Denmark proper, alabaster and marble for statuary.

Government Takes Over a Quarry

The property of the South Construction Company, consisting of a stone quarry and equipment near Sellersburg, Ky., has been taken over by the Government and the output will

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be used in Jeffersonville. Crushed rock is used for many purposes at the Government Depot, and it will be hauled there from the quarry. The mogul and seven freight cars that belong to the Louisville & Southern Indiana Traction Company have been taken over with the quarry, and from now on no person or corporation can purchase crushed stone from the South Construction Company unless the demands of the Government should be satisfied. The company has been furnishing stone to New Albany and Floyd county for street and highway purposes, but the supply from now on will have to be found elsewhere. The taking over of the property has solved the question of where the Government was to secure rock for building streets at the depot and for other purposes. At one period it practically was decided to open a new quarry, and an estimate on the cost of machinery was made. The quarry on the Bailee L. Burtt farm was considered at another time.

Limestone and Sandstone

At a meeting of the stone operators of the Bedford district, it was decided to grant a general wage increase, to take effect June 16. The greatest advance was given to the class drawing the lowest pay, and amounted to about 17 per cent. Other advances ranged from *2 to 15 per cent. The increase applies to the entire district.

The No. 1 mill of the National Stone Company, near Bloomington, Ind., was destroyed by fire the past month, resulting from a hot boxing on a line shaft. The loss is $15,000, with no insurance.

The Bridgeport, Tex., Cement & Stone Company has opened a crushed stone office at Cleburne, Tex.

A boiler in the limestone quarries of the Wharton Steel Company, near Franklin, N. J., exploded recently and killed two employees. The entire boiler house was blown to bits.

Official recognition of the economic value of agricultural limestone is contained in a Kentucky law regulating its transportation, says a Chicago agricultural paper. The act specifies a scale of maximum freight charges on limestone during the period of the war. These vary from 30 cents per ton for a 30-mile one-road haul to $1.60 per ton for a haul of over 360 miles. The rates are not so low as those already operating for years in Illinois, which are half a cent a ton per mile, with a 25-cent minimum charge, but they are counted a great advantage for Kentucky farmers whose use of limestone has been hindered by high freights. In order to secure the special rates the consignee must certify to the Commissioner of Agriculture, Frankfort, Ky., that the limestone is to be used for agricultural purposes, the amount ordered and from whom, giving the name of the station where the shipment originates.

A large part of the machinery of the Hoadley stone mill, south of Bloomington, that was damaged by fire, has been sold to a Chicago firm. This sale included tramway, traveler, three boilers and some electrical equipment, and was for $16,000, the high price being brought because such machinery cannot be got now at any cost.

The Ohio Fuel Supply Company will erect a five-story office building at Front and Elm Streets, Chicago. All the trimmings will be of Indiana limestone.

New Companies

The Bunker Hill Stone Company, of Bunker Hill, Ind., to do a general construction business. Capital $5,000. Directors: Benjamin F. Hatfield, John L. Miller, Jeremiah O. Ault, W. T. Turley.

The Principio Sand & Stone Corporation, of Wilmington, Del., to deal in stone, sand, gravel, etc. Capital, $300,000.

Elmwood Monument Works, of Elmwood Park, Ill., to manufacture and sell granite and marble. Capital $2,500. Incorporators: James A. Steven, N. M. Jones and D. P. Richards.

The Ingalls Stone Company, a Delaware corporation organized to do a general quarrying and stone business, has qualified to do business in Indiana, $375,000 of its capital stock being represented in that State. C. C. Ingalls, Bedford, is named as agent.

The Eureka Marble & Tile Works, of Columbus, O., to manufacture and deal in marble, tile, etc. Capital $25,000. Incorporators: C. Lowensohn, Z. C. Yost, L. Geiger, L. W. Hunt, C. A. Pierce.

The New Jersey Limestone Quarries, of Belvidere, N. J., to quarry and deal in limestone. Capital $100,000. Incorporators: Aaron D. Keller, William F. Glose, Daniel C. Reilly, Bethlehem, Pa., and Charles A. Dahlke, Belvidere.

The Orbisonia Lime & Lumber Products Company, of Dovel, Del., to manufacture lime and the burning and refining of limestone. Capital $100,000.

F. T. Horton Company, of Hoboken, N. J., to manufacture and deal in lime. Capital, $25,000. Incorporators: Forest T. Horton, Anna Horton, West Orange, N. J.; Theodore Lane, Long Island.

MEDIAEVAL FRENCH STONEWORK
West entrance, Church of St. Gertrude, near Caudebec-en-Caux. From a sketch by H. Raine

Hooker Crushed Stone Company, of Chattanooga, Tenn., to quarry and deal in stone. Capital, $5,000. Incorporators: G. H. Jacoway, G. Shalliday, A. Shalliday, J. B. Sizer, John A. Chambliss.

To Investigate Power Plant Efficiency

The United States Fuel Administration announces the appointment of Henderson W. Knott to manage the field force of engineers and inspectors which is at work among the power plants of the country, carrying out a campaign of instruction and inspection designed to bring the use of fuel for the production of power to the highest possible efficiency and economy. Mr. Knott has been the general manager of the

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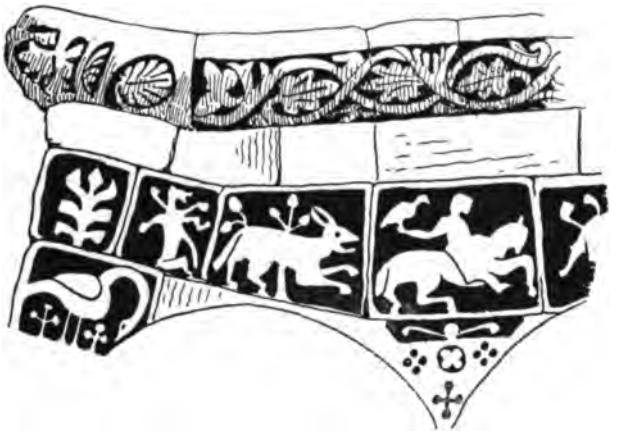
Morgan Crucible Company, of New York City. The appointment of Mr. Knott is a part of the plan originated by David Moffat Myers, advisory fuel engineer of the Fuel Administration, to have each of the 250,000 steam plants in the United States visited by a competent man who can make suggestions and report in connection with the questionnaire originated by Mr. Myers, working with committees from the four great engineering societies. This work will naturally require a large number of inspectors devoting their time to traveling among the steam plants. This field force will be organized by states in order to give it greater force and efficiency. Many of the state heads, who work directly under the



MARBLE WORK AT SAN MICHELE, LUCCA, ITALY
A portion of the inlaid carving which covers the entire arcade and many of the columns

State Fuel Administrators, have already been appointed, and Mr. Knott, co-operating with Mr. Myers, will complete the list of state appointees. Mr. Knott will, at an early date, visit the states already organized to study the work being done by the men in the field, and to speed up the inspection program.

Business Brevities

The Elgin County, Ont., commissioners have purchased two farms for $11,000 in order to obtain an adequate supply of gravel for road improvements.

Local switching charges have been increased under orders of the Railroad Administration. This will result in doubling the charges on many commodities, such as sand and gravel, moving under commodity rates and originating within switching districts. No carload shipment will be accepted for even local switching movement at less than $15 a car.

The city of Burlington, Vt., is in immediate need of one thousand tons of crushed stone for road work.

The German American Clay Company, of Muncie, Ind., has changed its name to the American Clay Company.

The Public Works Department of Boston announces that all its resources are now engaged in street improvenemts for the coming year, the greatest in the history of the city. Eighteen important streets will be repaved, most of them with granite blocks. The repairing of Atlantic Avenue, the biggest job on the list, will be done with smooth granite blocks at an estimated cost of $366,000.

Queens Borough, New York, will spend $1,109,400 for local improvements, much of it for paving and street work.

Judgment by default has been entered in the Court of Common Pleas at Hartford, Conn., for the Hartford Sand & Stone Company to recover $13,167 and costs of $29.04 from Frank A. Coburn and wife of West Hartford.

A new wage scale for the stone cutters in the Philadelphia jurisdiction, which went into effect on June 1, established an increase from 65 cents to 72½ cents an hour for cutters and one dollar more a day for carvers and sculptors. It is also stipulated in this year's new agreement, for the first time in the history of that organization, that the association shall include machine stone cutters.

The city of Quincy, Ill., has paid the first yearly installment of $2,000 on the Campbell Brothers' stone quarry, north of the city, purchased by the municipality for $6,128.69. The city, with certain reservations, is given the right to put the quarry to use at any time thereis to be no interest charge on deferred payments of purchase price.

Allen County, O., will furnish a large amount of crushed stone from the county plant for repairing the Dixie and the Lincoln highways within its boarders.

The Schwind Stone Company has purchased a tract of unimproved land at Lanvale and Popular Grove streets, Baltimore, Md., for $4,650.

Government Work

Sealed proposals will be received by the Lighthouse Inspector, Baltimore, Md., until July 15, 1918, for furnishing and placing riprap stone at light stations in the Fifth District.

The Lighthouse Inspector at Boston, Mass., will purchase 4,850 tons of granite riprap stone.

Bids will be received by the Supervising Architect, Treasury Department, Washington, D. C., until July 18, for the erection of a new post office at Eldorado, Kan.

Bids will be received at the United States Engineer Office, Custom House, New Orleans, La., until July 12, for furnishing and delivering stone for Head of Passes and Southwest Pass, Mississippi River.

Construction Notes

The Royal Bank of Canada, Montreal, has purchased a site in Nanaimo, B. C., and will erect a branch banking office.

A clinic building of Tyndall stone will be erected at Swift Current, Sask., after plans by Reilly, Dawson & Reilly, of that place.

The Winnipeg, Man., General Hospital will erect a psychopathic building, after plans by J. H. G. Russell, of that city. It will be trimmed with Tyndall stone.

The Dime Savings Bank, Fleet Street and DeKalb Avenue, Brooklyn, has awarded the general contract for a $70,000 addition to its banking building to the William L. Kennedy Construction Company, 100 William Street, New York. The architects are Walker & Ward, 52 Vanderbilt Avenue, New York.

Bids will be received until July 15 for a stone and brick high and grade school at Cattaraugus, N. Y. The architect is W. T. Towner, 100 Morningside Drive, New York.

The Norwegian Lutheran Zion congregation, of Port Richmond, S. I., will build a new church.

The Brooklyn Eye and Ear Hospital will erect a new hospital building, costing $200,000, on Schermerhorn Street. The plans are by Crow, Lewis & Wickehoefer, 200 Fifth Avenue, New York.

The contract for the erection of the new $200,000 banking building for the National Bank of Charlotte, N. C., has been awarded to C. T. Wills, Inc., of New York.

J. McNabb & Son, Grand Rapids, have been awarded the contract for the erection of the new hospital for the Sisters of Mercy, at Muskegon, Mich. It will cost about $160,000.

St. Hyacinth's congregation, Wolfram Street, Chicago, will erect a $250,000 church.

Gregg & Leisenring, Washington, D. C., have prepared plans for a church and Bible school for the Lutheran Church of the Incarnation, in that city.

The contract for the erection of a new banking building of granite, limestone and brick at Darien, Conn., for the Home

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Bank & Trust Company, has been awarded to F. H. Wakeham, 4 West Forty-seventh Street, New York.

The Department of Public Works of Canada is planning the erection of a $1,000,000 home for soldiers at Winnipeg.

The Y. W. C. A., of Charlestown, S. C., will erect a new building.

The First National Bank, of Alexandria, La., will erect a ten-story banking and office building, to cost about $300,000. The architect is E. Weil, New Orleans.

The American Exchange Bank, of Milwaukee, Wis., is planning the erection of a ten-story banking and office building.

Kemper Military School, of Boonville, Mo., will erect a school building, costing about $100,000. The architect is T. W. West, Sedalia, Mo.

St. Paul's congregation, of Ottawa, Can., will build a stone and brick church, costing about $75,000.

T. Eaton Company, 190 Youge Street, Toronto, Can., will erect a $1,000,000 office building with stone trim.

Grace Episcopal Church, College Hill, Cincinnati, O., will build a stone parish house, with equipment for Sunday school and gymnasium classes and rooms for meetings of church organizations.

A. S. Alschuler, 28 East Jackson Street, Chicago, is preparing plans for a two-story branch library for the Chicago Public Library.

St. Stanislaus Kosta Church, of Niagara Falls, N. Y., will build a parochial school, costing about $75,000, after plans by W. H. Zawadski, 798 Fillmore Avenue, Buffalo.

The Federal Reserve Bank, of Kansas City, Mo., is planning the erection of a banking building at Grand Avenue and Tenth Street, in that city, to cost in the neighborhood of $750,000.

W. R. Briggs, Bridgeport, Conn., is preparing plans for a new building for the City National Bank, of that city.

A $100,000 addition will be built to the Technical School at Ottawa, Can., after plans by J. A. Ewart, of that city.

The Elks of Beaumont, Tex., will build a club house after plans by Watson & Steinman, of that city.

Whiton & McMahon, Hartford, Conn., are preparing plans for a $250,000 school building in that city.

Los Angeles County, Cal., will erect a $100,000 hospital at San Fernando.

The First Methodist congregation, of Paris, Tex., a merger of two congregations, will build a new $100,000 church.

The Masons of Allentown, Pa., are planning the erection of a $200,000 temple.

The University of Missouri will build a school of journalism at Columbia, Mo.

The South Carolina Baptist Hospital will erect an eight-story stone and brick building at Columbia, S. C.

Bonner Springs, Kan., will erect a stone and brick school building, after plans by Smith, Rea & Lovitt, Kansas City, Mo.

A city hospital will be erected at Highland Park, Mich., costing about $300,000. The architect is M. J. Sturn, 116 South Michigan Avenue, Chicago.

Superior, Wis., will erect a $150,000 school, after plans by F. A. Johnson, of that city.

Imports of Graphite Forbidden

The restriction upon the import of plumbago or graphite has been extended by the War Trade Board, to be effective for the entire calendar year of 1918. Under the List of Restricted Imports No. 1 this restriction was made absolute until July 1 of this year, the possibility of importing not to exceed 5,000 long tons for the remainder of the year being left open should investigation prove that stocks in this country were inadequate to meet the home requirements for the entire year. As a result of the investigation, it has been found that present stocks, together with the home production, suffice to meet the home requirements until well into 1919. The restriction has therefore been continued in effect, and the Bureau of Imports has been instructed to issue no licenses for the importation of plumbago or graphite for the rest of the calendar year.

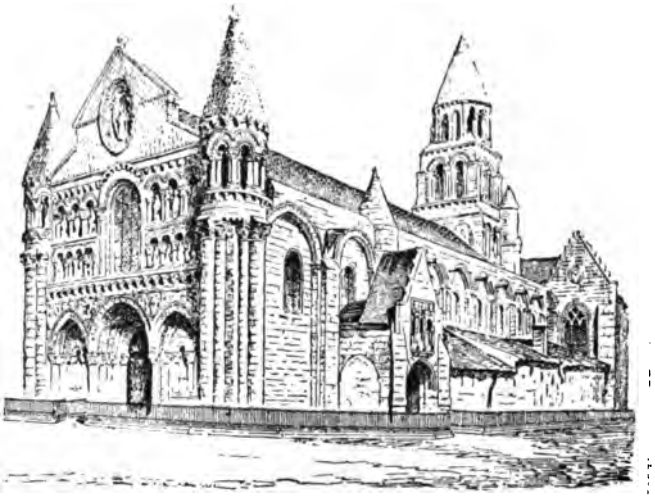
Business Embarrassments

C. Clayton Bourne and James G. Graham have been appointed receivers for John B. Rose Co., dealers in sand and gravel, at 103 Park Avenue, New York.

Trade Notes

The Sullivan Machinery Company, 122 South Michigan Avenue, Chicago, has issued a bulletin illustrating and describing the Sullivan DR-6 mounted water hammer drill. While designed primarily for drifting and tunnelling, this drill is used for a wide range of mining, quarrying and contracting work. It weighs 148 pounds, employs round, hollow drill steel, and is adapted for use on a standard column, tripod or bar. It is very powerful and is capable of rapid drilling under the most severe conditions encountered. It combines the cutting speed of the hammer type of drill with the stability and ruggedness of the older reciprocating piston machines. A copy of the bulletin can be had on application to any of the offices of the company.

On July 1 the Sullivan Machinery Company removed its Boston office from 185 Devonshire Street to Room 516, Boston Safe Deposit & Trust Company Building, 201 Devonshire Street. Mr. George E. Wolcott is the New England sales manager for the company. The Sullivan Machinery Company has established a branch office in Washington, D. C., in Room 210, Union Trust Building, corner Fifteenth and H Streets. It is in charge of Ralph T. Stone, formerly associated with the New York office of the company.



NOTRE DAME LA GRANDE, POITIERS, FRANCE
A striking example of late Norman stonework near the scene of the great English victory

Mr. A. Niedermeyer, for many years connected with the Worthington Pump & Machinery Corporation, most recently as works manager of the Snow-Holly Works of that corporation at Buffalo, N. Y., has resigned to devote his entire time to enterprises of his own.

The Ingersoll-Rand Company, 11 Broadway, New York, has issued several circulars describing the "Little David" line of pneumatic tools, suited for various uses, and the Leyner shank and bit punch for drill steel work.

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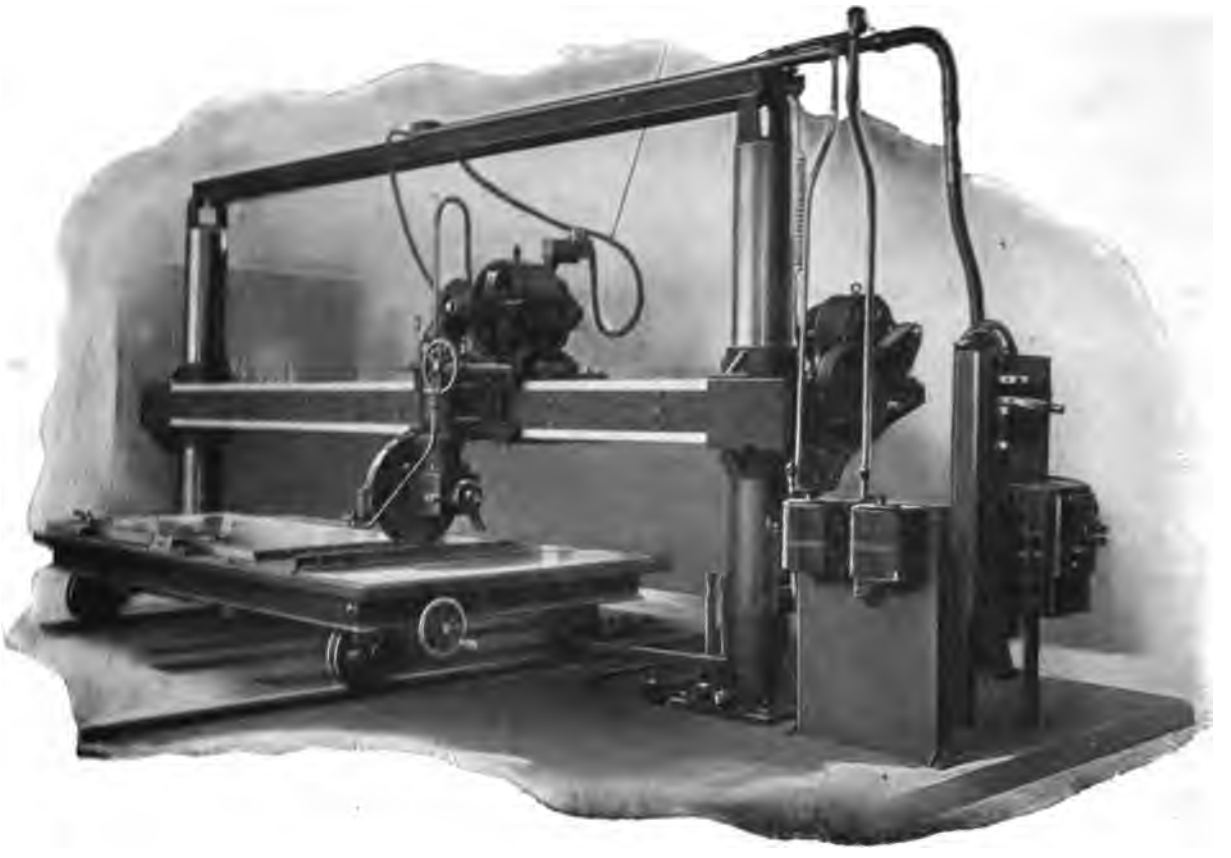

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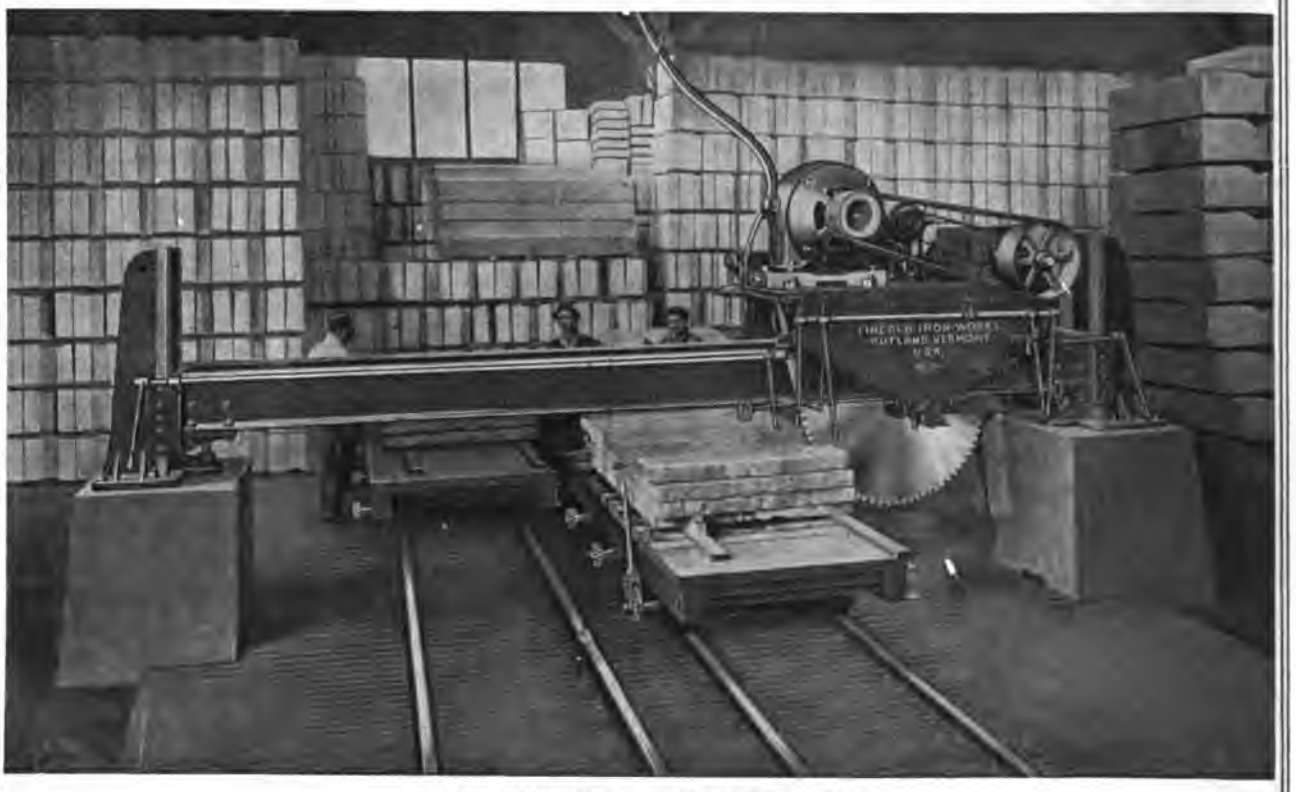

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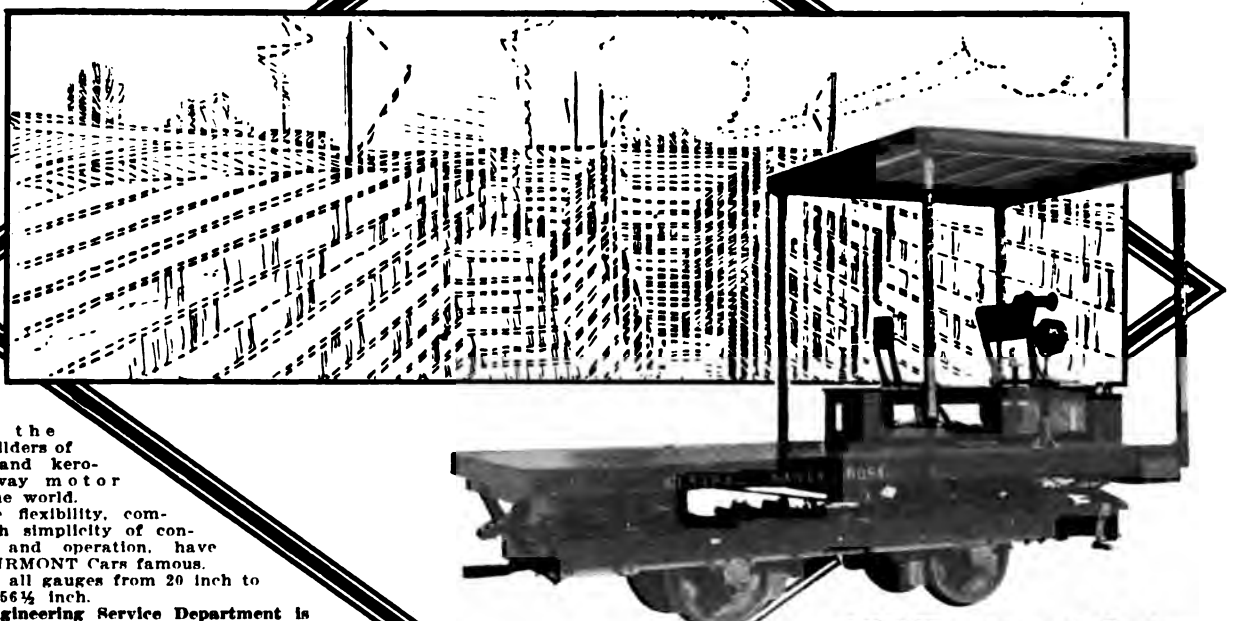

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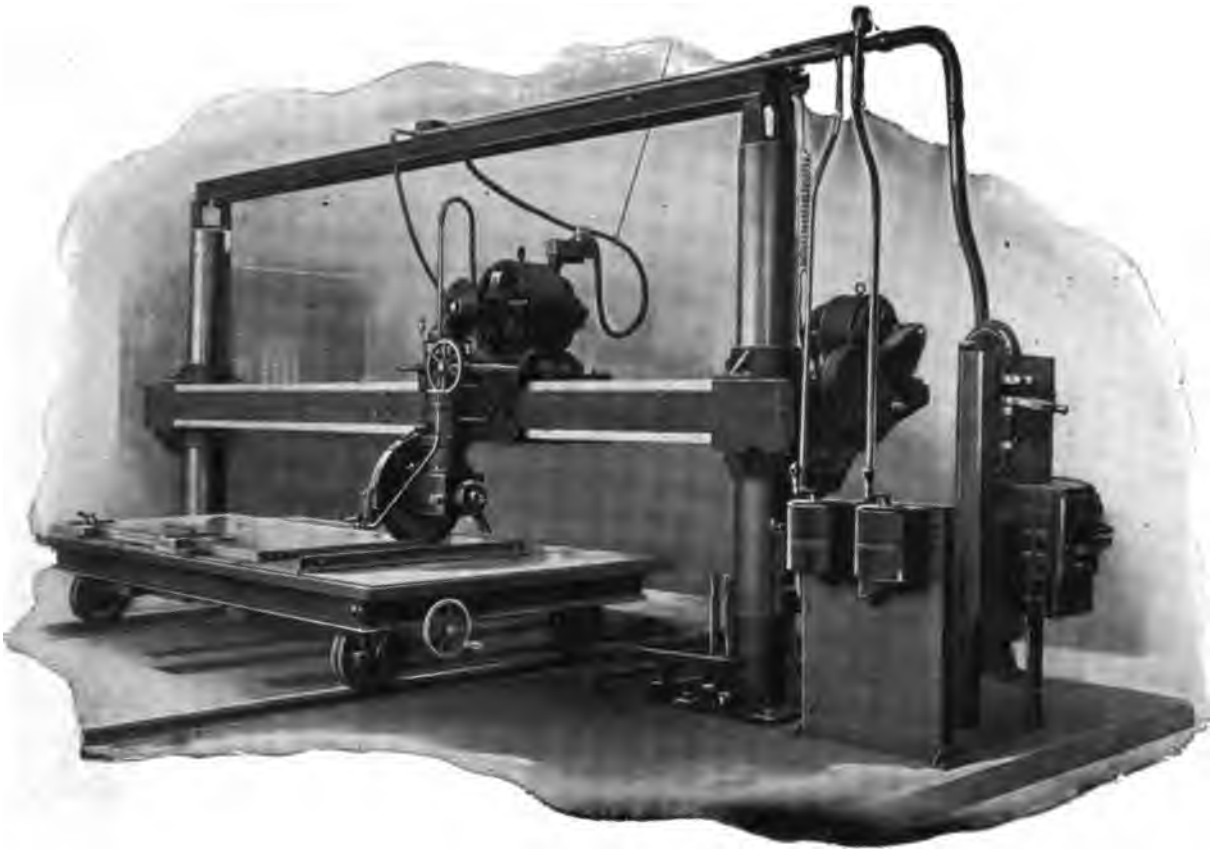

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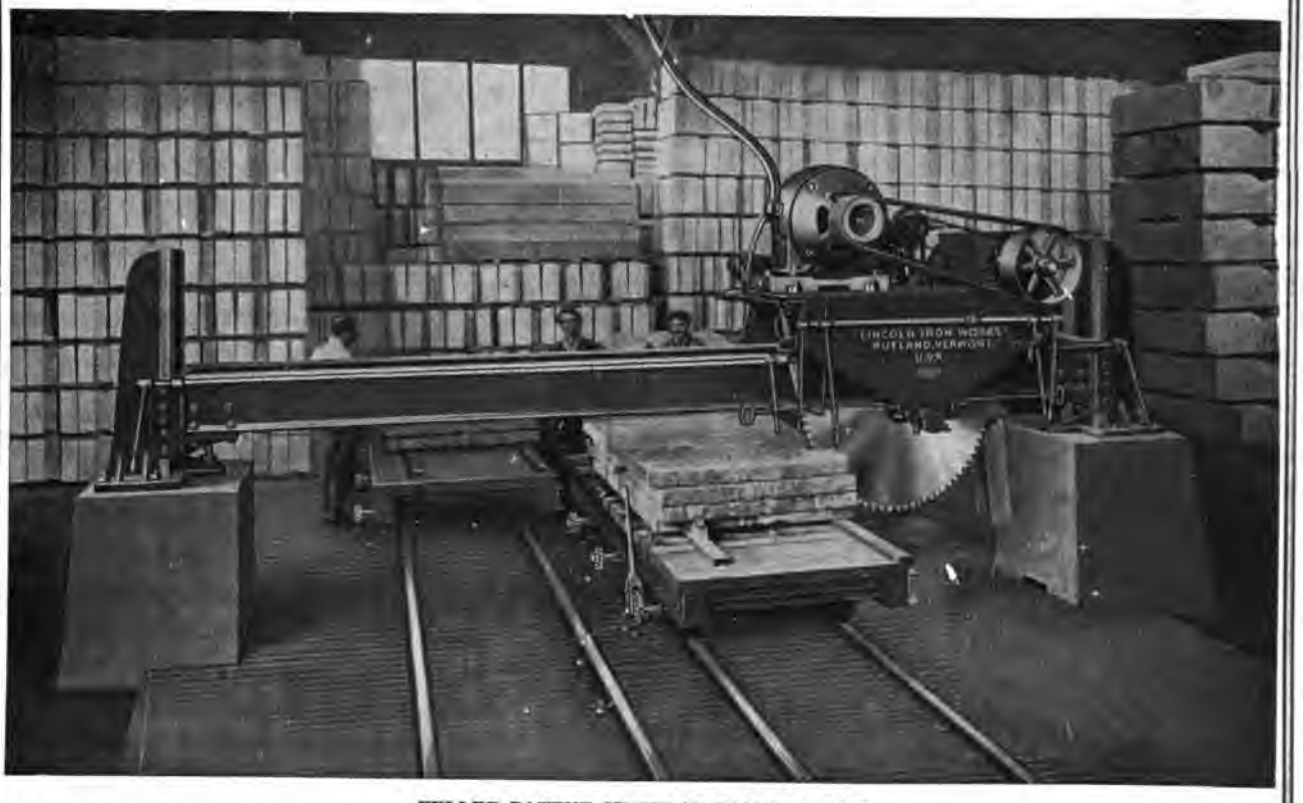

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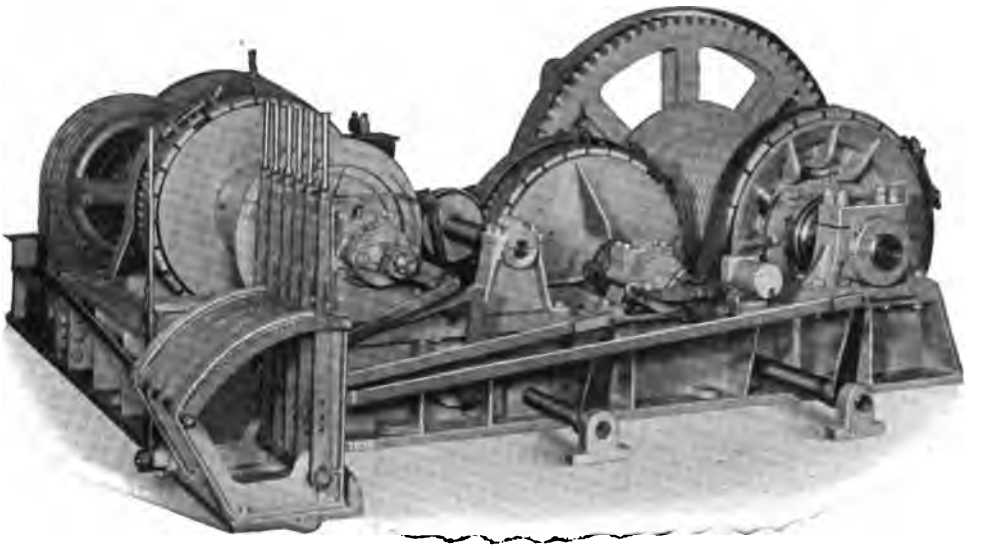

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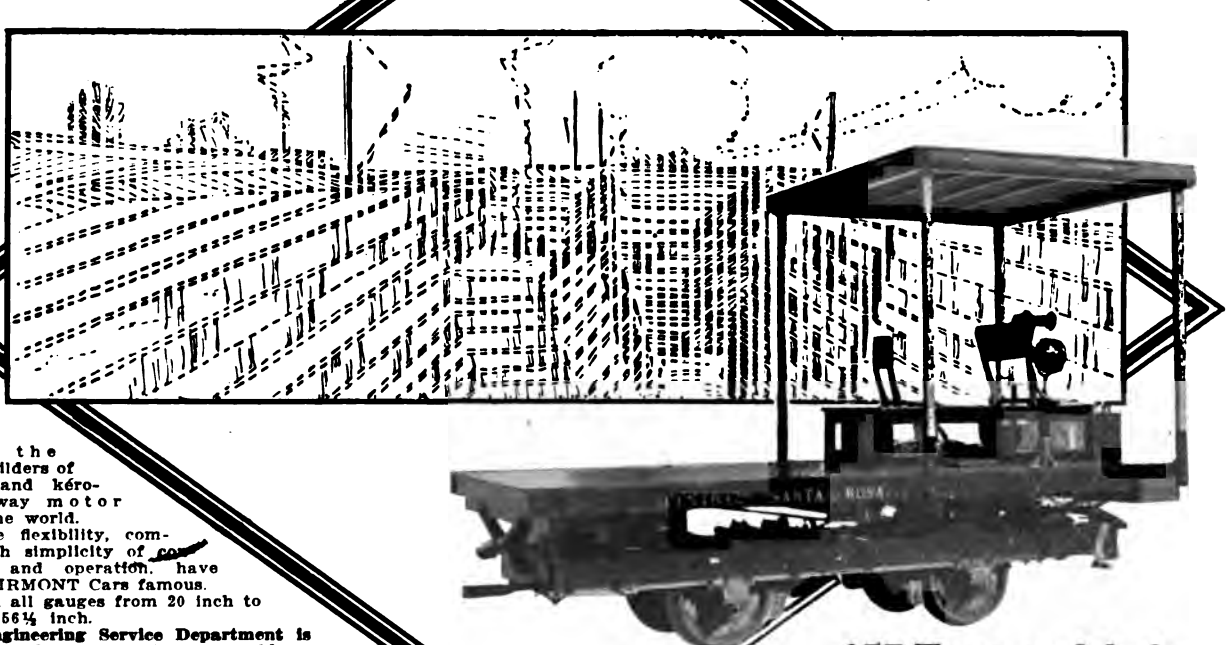

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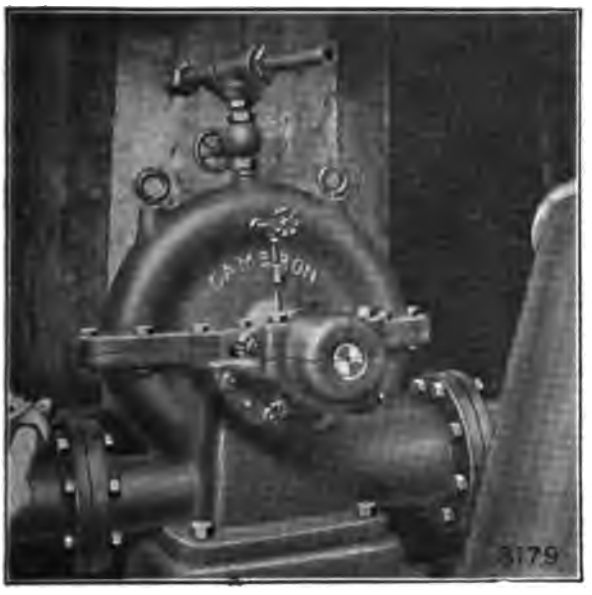

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FRANK W. HOYT, Editor

VOLUME XXXIX | SEPTEMBER, 1918 | NUMBER 9

CONTENTS

	PAGE
GRANITE FOR BUILDING	409
BUYING BUILDING MATERIAL WHOLESALE	410
TUFA AS A BUILDING STONE	410
HIGHWAY MAINTENANCE IMPERATIVE	410
WAR AND THE BUILDING STONE INDUSTRY	411
THE USES OF SLATE	412
A NOBLE MEMORIAL FOR WAR HEROES	413
THE MARBLE CAVES OF OREGON	413
PERTINENT LAWS ON BUILDING	413
DEVELOPMENT OF ARGENTINE MICA INDUSTRY	414
BUILDING IN NEW YORK CITIES AT LOW EBB	414
BUILDING INCREASES IN TORONTO	414
WHAT MISSOURI OFFERS IN STONE	415
MARKED GAIN IN LIMESTONE FOR FLUX	416
TEARING DOWN GRANITE BUILDINGS	416
MARL PRODUCTION SHOWS INCREASE	417
A WAR MEMORIAL CLOISTER	417
GRAPHITE FROM MADAGASCAR	418
LIMESTONE AND ONYX CAVES	418
DECREASE IN ITALIAN MARBLE PRODUCTION	419
ARCHITECTS AND CONTRACTORS	420
EDITORIALS:	
Stone and Coal	422
Cut Stone Cheaper than Terra Cotta	423
Sand, Stone and Gravel Made Non-Essential	423
BUSINESS BREVITIES	424
LIMESTONE AND SANDSTONE	424
MARBLE AND GRANITE	424
LIMESTONE AND ROCK PHOSPHATE	425
CONSTRUCTION NOTES	425
ILLUSTRATIONS:	
Modern Marble Quarry and Equipment.	
Getting Out Big Blocks of Marble.	
Design for a Limestone Residence.	
First Presbyterian Church at Greensburg, Pa.	
Rockface Ashlar with Cut Stone Trim.	
Courtyard at Westminster, London.	
Gateway of the Sun, Toledo.	
Abbot's Bridge at Waltham, Eng.	

ALPHABETICAL LIST OF ADVERTISERS

	PAGE
Appalachian Marble Co.	400
Ardolino Brothers	432
Bacon, Earl C.	433
Barr, Thaw & Fraser Co.	432
Bedford Steam Stone Works	432
Blum & Delbridge	432
Bowman & King Stone Co.	432
Brodix & Malone	404
Brown, George & Co.	407
Buckeye Gray Sandstone	406
Building Stone & Clay Products	432
Cameron, A. S. Steam Pump Wks.	439
Carthage Marble & White Lime Co.	432
Chicago & Bloomington Stone Co.	432
Clark-Conroy & Co.	432
Cleveland Stone Co.	405
Consolidated Stone Co., The	397
Continental Car Co. of America	433
Craig Co., John J.	400
Dallet Co., Thos. H.	437
Dark Hollow Gray Limestone	398
Empire Stone Co.	432
Farrell Foundry & Machine Co.	433
Fairmont Gas Engine & Railway Motor Car Co.	430
Falt & Co., J. P.	398
Frenier & Son	433
Furst-Kerber Cut Stone Co.	399
Georgia Marble Co., The	401
Gray "Canyon" Sandstone	405
Gray Eagle Marble Co.	400
Gillies & Sons, James	432
Hanlein & Son, Henry	398
Harrison Supply Co.	431
Heinlein Cut Stone Co., John	432
Hoosier Cut Stone Co.	398
Indiana Limestone Quarrymen's Association	394-395
Indiana Quarries Co., Inside back cover	
Ingersoll-Rand Co.	431
Laidlaw Dunn Gordon Plant	437
Lane Manufacturing Co.	429
Lidgerwood Manufacturing Co.	437
Lincoln Iron Works	434
Manning, Maxwell & Moore, Inc.	433
Marble & Marble Workers	401
Marine, Arlando	432
McDermott Stone Co.	404
McLaren & Sons, James	396
McMillan & Son, W.	398
Mt. Airy Granite	407
Meyers Machine Co., Inc., Willard F.	435
Miller Co., David	432
Monahan Stone Company	432
Napoleon Gray Marble Co.	408
New Albany Machine Mfg. Co.	433
North Carolina Granite Corporation	407
Ohio Quarries Co.	406
Patch, F. R., Mfg. Co., Inside back cover	
Payne & Co., N. B.	433
Phenix Marble Co.	408
Pollard Mfg. Co., Ltd.	428
Quincy Column Turning Co.	404
Riverside Machinery Depot	440
Rockport Granite Co.	404
Roebling's Sons, John A.	430
Ross & Republic Marble Co.	400
Royal Marble Co.	400
"Silk of the Trade"	407
Shaw Electric Crane Co.	433
Shea & Donnelly Company	399
South Dover Marble Co.	Back cover
Spurr & Son, J. J.	396
Star Stone Co.	404
Steam Stone Cutter Co.	434
Struble Cut Stone Co., Henry	432
Sullivan Machinery Co.	433
Sutermeister Stone Co., A.	432
Tompkins-Kiel Marble Co.	402-403
Tom-Kiel Cement	436
Trow & Holden	436
Victoria Marble Co.	400
Winnesboro Granite Corp.	407
Worthington Pump & Mach'y Co.	437

BUYERS' DIRECTORY OF THE STONE TRADES, PAGE 438
CLASSIFIED ADVERTISEMENTS, PAGE 440

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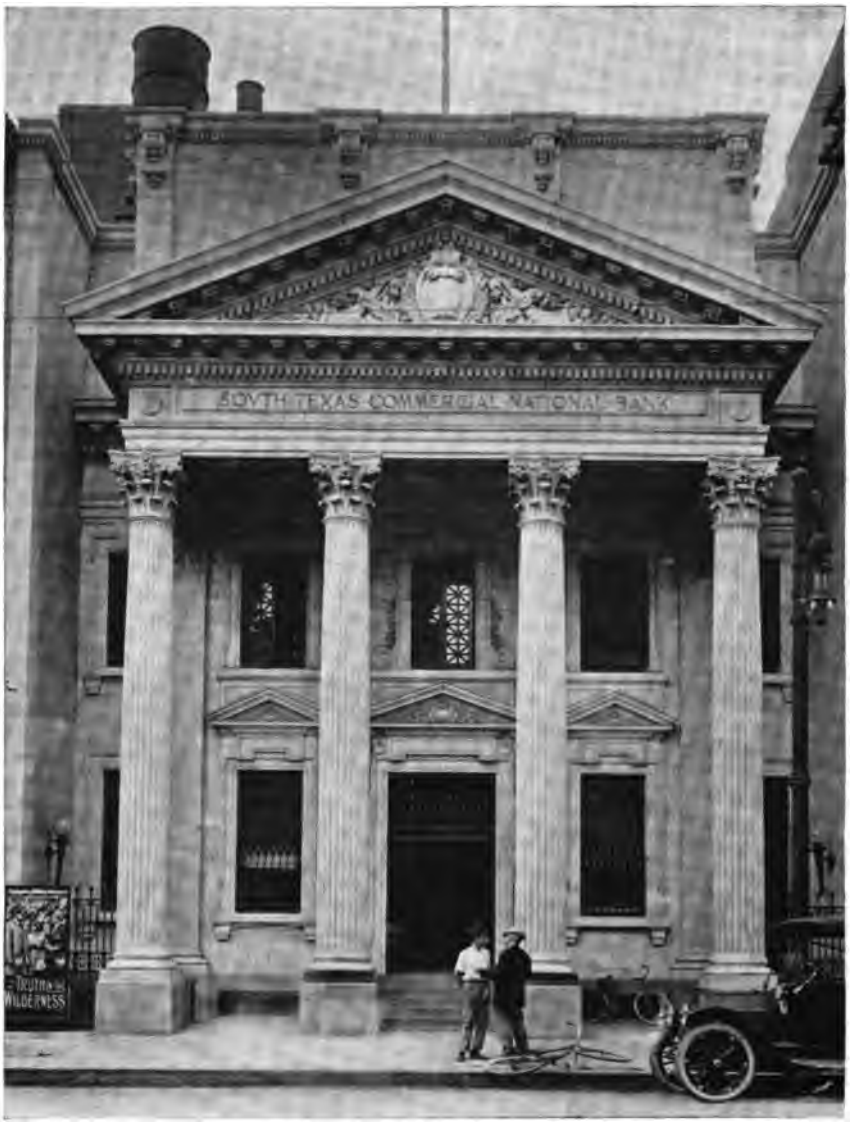

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STONE

VOLUME XXXIX SEPTEMBER, 1918 No. 9

Granite for Building

THE total value of granite sold for building stone in 1917 was $2,881,128, a decrease of $1,083,305, or 27 per cent., compared with 1916. The rough stone sold was valued at $590,310, which was $312,736, or 35 per cent., less than in 1916; the dressed or manufactured stone was valued at $2,290,818, which was $770,569, or 25 per cent., less than in 1916. Accurate figures showing quantities are not yet available, but owing to a general increase in price the decrease in percentage of output was considerably more than that in value. The statistics given were compiled under direction of G. F. Loughlin, of the United States Geeological Survey, in co-operation with the National Building Granite Quarries' Association and the State Geological Surveys of Georgia, Maryland, Minnesota, Missouri, New Jersey, New York, North Carolina, Pennsylvania, Virginia, Washington, and Wisconsin.

Sales of granite for building were reported from 26 States in 1917 compared with 28 in 1916. Massachusetts, with a total value of $646,506, and Maine, with $525,604, ranked first and second. New Hampshire, second in rank in 1916, was third in 1917, with a value of $337,233. Massachusetts, with $132,700, and Maine, with $100,941, were the only States whose sales of rough granite exceeded $100,000 in 1917, and each of these showed a decrease of about one-third compared with 1916. New Hampshire followed with $78,484, a gain of about one-quarter. Pennsylvania, which ranked first in sales of rough granite in 1916, with a value of $224,360, was credited with only $87,978 in 1917. The few other States that showed gains had values of less than $15,000.

In sales of dressed granite also Massachusetts, with $513,806, and Maine, with $424,663, were the leading States. Maine, however, has made continuous gains in 1916 (2 per cent.) and 1917 (55 per cent.), whereas Massachusetts in the same years has suffered losses of 17 per cent. and 19 per cent., respectively. North Carolina's output, chiefly stone for mausoleum work, though classed previously as building stone, has been transferred to monumental stone, the class in which it more properly belongs. New Hampshire, Vermont, California, Georgia, Rhode Island and Minnesota had values in excess of $100,000 in 1917. Of these Georgia made gains in the last two years, its value for 1917 nearly doubling that of 1915, and Rhode Island more than tripled its value for 1916. The other States named showed decreases of 10 to 50 per cent.

The reduced output during the last year was due to a marked increase in the cost of labor, material and freight. The general average increase was probably about 30 per cent., but some items increased much more.

Prices increased, though in most places not in proportion to the increase in costs. Some producers reported an increase of 20 to 30 per cent. One company in Maine reported an increase of 50 per cent., and two companies in New Jersey an increase of 100 per cent. for rough stone. A few companies in New Hampshire, Maryland and the District of Columbia reported no increase in price.

The demand was prevailingly small, owing to a general curtailment in the erection of both Government and private buildings in which granite is ordinarily used. This curtailment in turn was caused by a shortage of labor for building, a shortage of other building materials, and the increased price of these materials and of building stone. New York's marked decrease was largely due to the completion of the Kensico dam, for which a considerable quantity of granite was sold in 1916. One producer in Wisconsin attributed decreased demand in part to eastern competition, and two small producers in Massachusetts complained of competition with artificial substitutes for granite. The adverse conditions compelled several quarries in different parts of the country to suspend operations.

One company each in California, Maine, New Hampshire and Pennsylvania reported that the demand in 1917 equaled that in 1916, and a few companies in Rhode Island, Delaware, Maryland and Colorado reported that it was even better. Some of these, however, particularly those in Maryland, could not take advantage of the favorable demand, owing to shortage

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of labor and cars. The increase in Georgia, Maine and Rhode Island was due mainly to an increase in the production of a single company in each State. Arizona reported the sale of considerable granite in both 1916 and 1917. This was used in building the Yavapai County Court House.

As building operations were very active early in 1917, the curtailment in them not becoming marked until about midsummer, the production in 1917 may be considered an average between very good and very poor. The period of severe depression continued through the first six months of 1918, and as there is no prospect of early improvement in the production of building stone, as well as of other materials that are used mainly in buildings of the better classes, will probably be considerably less in 1918 than in 1917. The present abnormal period, in which most of the buildings erected are temporary, will probably be followed by a period in which permanent buildings of high architectural merit will be constructed, and this change will be reflected in a rapid recovery of the building granite industry.

Buying Building Material Wholesale

A central company for purchasing building material has been organized in Holland and has established headquarters at Mauritskade 33, The Hague. The plan and purpose of the company is thus explained by the manager, Mr. H. C. A. Henny:

The municipalities of The Hague, Amsterdam, and Utrecht, in conjunction with the Ministry of Waterstaat, which has charge of all public works of the State, were the originators of the company, but later more than 100 Dutch municipalities joined in this enterprise. The object of the company is to supply the different municipalities with as cheap building material as can be bought by buying in large quantities, but no private person can make use of the company. In other words, our aim is to assist municipalities only in erecting buildings needed for their population.

Frankly, I hardly think we shall be able to buy much from the United States, as least not to start with, under present circumstances; but even after the war I think high freight rates will make it impossible for the United States to compete with northern Europe and Germany. Our paving material we get from Sweden and Belgium, and for roofing we shall use our good old Dutch tiles.

Tufa as a Building Stone

On a tract of land owned by the Benedictine Fathers, located southeast of Mt. Angel, in Marion County, Oregon, there is a large deposit of rock called tufa. This rock is so soft that it can be cut with a knife when taken from the ground, but on being exposed to the air becomes hard as limestone. Several months ago A. W. Gould, of Seattle, became aware of the location of this rock, and seeing the possibilities of its use, organized a company known as the National Fire Proof Lumber Co. to place it on the market. As the rock is located back in the mountains several miles from a wagon road, it became necessary to get a road into the quarries. The county court was called upon to help, and an excellent road has been built to the place.

The new road winds up the Abiqua river, presenting some very beautiful scenery. An interesting feature of a recent visit to this place was a view of an old stone church that four of the Benedictine Fathers erected on the top of the mountain on the side of which the quarries are located. Twenty-eight years ago four Benedictines homesteaded four quarter sections of land, and where these sections cornered built this building. During the time of proving up, each resided in his particular corner of the building, living on his own land. The building is about 18 by 30 feet and is built from the tufa rock, cut by hand, and carried about half a mile up the mountain from the quarries by hand. This old building, which is in an excellent state of preservation, demonstrates the lasting qualities of the stone from which it is built.

Highway Maintenance Imperative for Transportation of Army Supplies

Methods of road maintenance will be an important part of the displays of the office of public roads and rural engineering, United States Department of Agriculture, in the combined Government exhibits at the New York State Fair in Syracuse, September 9 to 14.

War's demands have placed a big new burden upon the highways of the United States. Not only are great fleets of army trucks thundering over the roads near military posts and cantonments, but vast numbers of commercial trucks and horse-drawn vehicles are carrying farm products to market and transporting merchandise of every description from the city to the country and from one city to another, says an exchange. Where the railways, full of troop trains and army supply trains, have called for help, the highways of the United States have answered "Here!"

All this means that to prevent the roads from becoming rutted, crumbled and shattered and at length impassable under their burdens, the greatest attention must be paid to their maintenance.

The office of public roads and rural engineering is the agency that, with its other duties, administers the federal aid road act, believed to be the greatest stimulus to road building in American history, and that is in charge of enforcing the regulations of the National Highways Council, which recently was created to coordinate the federal agencies dealing with the highways. Its displays will not only demonstrate maintenance, but the tested methods of providing drainage, and foundations and how to build earth, gravel, sand-clay, macadam, brick and concrete roads.

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War and the Building Stone Industry

LAST month an account was given of the meeting of representatives of the building stone industry held in this city in order to appoint a War Service Committee, representing all the producers of building stone in the country. This meeting was called by the War Industries Board, with which the War Service Committee is to work in a spirit of full and general co-operation. During the month this special committee has met in Washington and organized. It issues the following "Brief in Behalf of the Building Stone Industry":

To the War Industries Board, Washington, D. C.

Actuated by a desire to co-operate in every way with the Government in the present emergency, we hereby pledge our hearty support in whatever action may be deemed necessary as affecting our industry and as outlined to us by your Mr. Humphrey in conference with us at New York last month, and beg leave to report that in compliance with the suggestion previously made to us we have perfected a permanent organization.

A War Service Committee has been selected consisting of Mr. H. E. Fletcher, of Boston, Mass., representing the New England Group; Mr. P. B. Parker, of New York City, representing the Central Group; Colonel Sam Tate, of Tate, Georgia, representing the Southeastern Group; Mr. R. M. Richter, of Bedford, Indiana, representing the Mid-West Group; Mr. Mastin Simpson, of Kansas City, Mo., representing the Trans-Mississippi Group, and Mr. John D. McGilvray, of San Francisco, Cal., representing the Far-West Group.

These several group chairmen were duly confirmed at meetings of their respective groups held at Boston, Mass.; New York City, N. Y.; Atlanta, Ga.; Chicago, Ill.; Kansas City, Mo., and San Francisco, Cal.—all within the past week.

They have organized by designating Colonel Sam Tate as National Chairman, and Mr. Charles T. Vandeveer as Secretary and Treasurer. Mr. Vandeveer will be located permanently in Washington on behalf of the Building Stone Industry and its War Service Committee, with offices at 626 Colorado Building, telephone Main 3932.

The action of the group meetings above referred to, confirming the unanimous opinion of the Chairmen of the War Service Committee on Building Stone, makes it imperative, in our opinion, that the fabricators of building stone for both exterior and interior use be included in our National organization. The quarrying and fabricating of stone for building use are so closely co-ordinated and inter-related that, in our opinion, the best interests of our Committee, and the War Industries Board, can be served by including the cut stone and marble plants under our Committee and we respectfully request your consent to such procedure.

IMPORTANCE OF THE BUILDING STONE INDUSTRY

The Building Stone Industry is one of the basic operations of the Nation, and represents a vast National resource, the conservation of the investment in which is of the utmost importance to our entire commercial fabric.

The output of natural building stone of all kinds is, under normal conditions, measured by tens of millions of dollars annually and the capital at stake may very conservatively be placed at fifty million dollars.

LABOR AND PUBLIC WELFARE

The conditions respecting labor in the numerous quarry districts, which may be found in all sections, are that a considerable contingent of workmen repre-

MODERN MARBLE QUARRY AND EQUIPMENT

The Quarry, Banks and Derricks of the Gray Knox Marble Company at Knoxville, Tenn.

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sents a second and third generation at this particular task. Many of these men have grown old in the service, are, in fact, not fittted for a change in occupation, and otherwise find themselves tied to their native localities through ownership of modest homes and dependence of family relations.

BUSINESS CONDITIONS

By reason of the consistent policy of the Government in discountenancing building operations, not directly or indirectly necessary for the prosecution of the war, the Building Stone Industry has already been reduced in volume to a point where the percentage of production for this business, as a whole, must probably be fixed at some point between 25 and 50 per cent. of normal. In effect the condition we have with us represents an irreducible minimum unless the industry with respect to its investment and organization is to be extinguished entirely. That we have been told is not the purpose. The fact of the matter is that perhaps in excess of one-half of the volume of operations remaining is fairly directly contributory to the Nation's war program, and we express the hope that the Government will recognize our pleading that many factors combine to justify a material expansion of these opportunities.

USES AND AVAILABILITY

A substantial proportion of the many different structures in course of erection and planned by the different Departments, is of a permanent and semi-permanent nature. We have in mind the housing program going forward under the jurisdiction of the Department of Labor, larger warehouses for the War Department, Officers' Quarters, Hospitals, Dormitories and other buildings for the military and naval establishments, Dry Docks, Sea Walls, Railroad Terminals, Bridges, Telephone and Telegraph Buildings, Ammunition and other factories, Schools, Y. M. C. A. Buildings and many more too numerous to mention.

We are convinced that we can demonstrate conclusively that natural stone may quite properly be called upon wholly or in part to render service in all such operations as have just been set out.

While ordinarily, natural building stone is the logical product in connection with such building operations, there are powerful reason why today more than ever its use should not only be encouraged but in fact insisted upon.

Likewise, for sanitary reasons, artistic value and permanency, stone for interior work should recommend itself for extensive use on side walls, toilet and shower partitions and floors.

COAL

The production of natural building stone involves the consumption of a negligible quantity of fuel, 3 per cent. to 5 per cent., as compared with substitutes involving fuel consumption approximating, probably, a ratio of pound for pound of fuel for finished product —or 100 per cent.

STEEL AND TRANSPORTATION

To relieve the pressing demand for steel and transportation, buildings can be constructed of natural stone of the wall-bearing type from material generally, and immediately, available in the several localities where such buildings are needed. Simplified designs with a minimum of ornamentation need not increase the first cost of such to any appreciable degree, if at all, over buildings designed with a large amount of structural steel, and their permanency and beauty cannot be questioned.

MAN POWER

The application of already existing machinery, now largely idle, reduces the amount of labor required in the production and fabrication of building stone to a minimum.

BY-PRODUCTS

These we cannot produce except as an operation concurrent with, and dependent upon, the production of building stone. We have in mind here fluxing and lime for the steel industries, lime for water purification, and fertilizer, crushed stone for railroad ballast, concrete work and road construction, paving and rip-rap. To undertake direct production of these essential by-products would enormously increase the cost of same and would destroy the value of any building stone quarry property so converted.

Finally, inasmuch as we have voluntarily complied with the expressed desires of the Government by curtailing the production of natural building stone in the United States, it would seem eminently fair and justifiable that the importation of all building material of a like nature from foreign nations be entirely suspended during such period of curtailment.

Respectfully submitted,

COL. SAM TATE
Chairman.

War Service Committee on Building Stone,
Washington, D. C., August 20, 1918.

The Uses of Slate

Slate is a material that is designed by nature for use where a clean, non-absorbent surface is required. It has great strength and durability and can be made neat and even beautiful where adornment is required, says the English organ of the slate industry. The surface is smooth and therefore it will not absorb oils or odorous or decaying organic matter. It is not affected by acids and is impervious to water, air and changing weather conditions. It is not sensibly affected by ordinary variations in the degree of heat. These qualities are not found in any other mineral product, taken in connection with the ease with which it can be worked and its consequent low price when compared with other materials used for the same purposes. It is really economical as well as highly satisfactory to use slate slabs for sanitary purposes. The more fully builders and contractors realize the fact that slate has made a

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place for itself for interior fittings of the buildings, as well as upon the roof, the more satisfactory will be the work they turn out. Among the various uses to which slate may be put for this purpose are bath tubs, urinals, wash trays, kitchen sinks, drainage cisterns, etc. For all these purposes and many more, the slate can be prepared at the factory according to the measurements supplied by the contractor and all that the latter has to do is to set the slate into place after it has been set up and fitted at the factory. Slate, used for this purpose, can be used either in its natural color or it can be given any color or any figure desired.

A Noble Memorial for War Heroes

Liverpool's memorial to those who have fallen in the war is to take the form of a memorial chapel in the cathedral. The cost is estimated at $250,000, and the design of the chapel and its ornaments has been prepared by the architect, Mr. Gilbert Scott. A Liverpool newspaper gives illustrations of the cenotaph and grille to be erected, and in a special article appealing for donations it makes the following statement:

"It is for this that the appeal is made. 'Appeal!' The word is incongruous. What is offered is an opportunity to each of us to be honest with our dead. No nobler memorial, none more suitable and permanent, none more accessible to the people could be devised than that which is intended. For the memorial is to be a transept in the new cathedral, forming a complete chapel where the names of those who have fallen will be recorded for all time, where the colors of local regiments will be hung and where memorial and anniversary services may fittingly be held. It is intended that the boundary between the chapel and the main building shall be marked by a grille of open metal-work of beautiful and delicate designs.

"Standing on a low platform of black and white marble in the center of the chapel will be an alabaster cenotaph or tomb, significant of much. Upon this cenotaph will rest, protected so that it will endure through the ages, a volume in which the names of our heroic dead will be inscribed."

The Marble Caves of Oregon

Amid the wilds of Southwestern Oregon, almost unknown to the world at large, is situated a series of underground chambers and passages remarkable for their size and for the beauty and unusual character of their decorations, writes F. E. Tuck. Within the last few years they have been made a national monument and are now known as the Marble Caves of Oregon.

At the present time a visit to the caves is no small undertaking. From Grants Pass or Medford, a thirty-mile drive, takes one to the camp at the end of the wagon road. The rest of the trip must be made on foot or mule back up a steep trail ten miles in length. During the summer months the Forestry Service stations a forester at the caves as guide and caretaker. He takes a special interest in conducting all visitors through the caves and in pointing out to them the many interesting features of the trip.

The caves consist of three and a half miles of marble passages and grottoes, ranging from one to four or five stories in height. In places the connecting corridors are so low that one must crawl on all fours for a considerable distance. Elsewhere the chambers are so large that the opposite walls and ceiling are scarcely visible in the dim candle light. The largest cavern measures over 500 feet in length and its arched ceiling is 100 feet above the floor.

Throughout the entire cave the stalactitic formations are rich and wonderfully varied. In some chambers the ceiling is a mass of small stalactites, from the points of which hang starlike glittering pendants—drops of water. In one superb room the roof is covered with gigantic inverted white tulips; in another folds of massive draperies cover the walls supported by immense fluted columns. Here stalactites reach down from above and embrace their stalagmitic sisters, thus forming pillars of surpassing symmetry and beauty. There a miniature Niagara stands outlined in white marble, beyond which a magnificent Solomon's Temple is carved deep into the heart of the mountain.

GETTING OUT BIG BLOCKS OF MARBLE
A view in the quarry of the Gray Knox Marble Company at Knoxville, Tenn.

The trail up to the caves is a long, steep climb, but as one ascends, a marvelous panorama of scenic beauty, of forests and canyons, of snow-capped peaks and distant vistas, is spread out before him which, even apart from the caves, makes the trip one long to be remembered and well worth the effort it has taken.

Pertinent Law Points on Building

The fact that a contractor becomes insane after commencing work on a job does not relieve his sureties.

An owner who has caused to be filed a 50 per cent. bond with sureties who are well worth the amount of the bond at the time the bond is recorded, but who afterwards become bankrupt, is entitled to the protec-

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tion of the law to relieve his property from mechanics' liens.

The completion which starts the time for the owner to file a notice of completion is a substantial completion and will not be postponed because of some trivial imperfection; each case rests on its own merits and the architect should be guided by his own good judgment as to when the building is completed.

An architect is entitled to a lien for his services in superintending the construction of a building, and has ninety days from the date of the actual substantial completion of the building, if no notice of completion has been filed, and sixty days from the date of filing a notice of completion, if one is filed, in which to record his lien, if he is employed by the owner.

An owner is not entitled to lock a contractor out of an uncompleted building, if the contractor is proceeding in good faith but with too small a force, under the so-called "three-day clause" in the usual building contract, but is authorized only to furnish an additional number of workmen.

An architect is responsible only for usual or ordinary care in the selection of his assistants and employees.

An architect who has not the skill which he represents himself as having and who fails to draw plans and specifications sufficient for the proper construction of a building which he has undertaken to erect, by reason of his lack of skill, is liable for any damage thereby caused.

A penal clause in a contract for a failure to complete on time will not be enforced if the actual damage can be ascertained, but for such failure the contractor is liable for the actual damage caused. In rare cases, where the damage cannot be ascertained, a penal clause will be upheld as liquidated damages.

A contractor can recover a bonus in a contract for completing work ahead of time and is entitled to a mechanic's lien therefor on the ground that it is a part of the original contract price.

A premature payment of a part of a contract price, made without the knowledge of the sureties, will exonerate the sureties on the common law bond to the owner.

A notice of non-responsibility must be recorded as well as posted on the premises.

Development of Argentine Mica Industry

The principal destination of mica exported through the custom-houses of Argentina during the year 1917, according to data furnished to the United States Consulate at Buenos Aires, was: England, 71,012 pounds; United States, 52,470 pounds; Italy, 12,099 pounds, and Spain, 2,809 pounds. The exploitation of mica in Argentina is only incidental up to now, according to a report from Consul General W. Henry Robertson, Buenos Aires. It does not constitute an established industry, and it is made on a rather reduced scale by numerous private individuals, according to the fluctuations of the market. Very great changes are noted from one year to another. On the other hand, according to data in the possession of the Argentina bureau of mines, the national industries make considerable use of mica produced in Argentina, so that the exportation of this article depends upon the variable necessities of the industry. There will be undoubtedly a greater production of mica in 1918 than in 1917, since an increasing interest in the exploitation of this article is very noticeable. No special study has been made with this mineral, from the standpoint of its industrial possibilities. It is known that the mica beds are numerous and abundant, especially in the Provinces of Cordoba, San Luis and San Juan, and that in many of these sheets of the highest quality are obtained. The geographic studies that have been published show equally the abundance of mica strata in sight. But it is not possible to form a joint appraisal from these data regarding the quality and quantity of the exploitable beds.

Building in New York Cities at Low Ebb

Reports of estimated cost of building work authorized in the first and second class cities of New York State show a total of $7,072,332. This is the smallest volume of building reported for any June since 1915, which is the date when these statistics were first collected. In comparison with May the decline was 23 per cent, but contrasted with June, 1917, the decrease was 54 per cent. The building costs reported for June, 1917, 1916 and 1915 were, respectively, $15,000,000, $31,000,000 and $16,000,000. The borough of Manhattan and the cities of Utica and Yonkers filed plans for June, 1918, showing larger expenditures than in June, 1917. The borough of Manhattan and the cities of Albany, Rochester, Utica and Yonkers reported a greater volume of building in June, 1918, than in May, 1918.

Building Increasing in Toronto

The building permits in Toronto during the month of July indicate a marked increase in building activity as compared with last year. The records of the city architect's department show the following figures: Total for month of July, 1918, 475 permits, value $1,094,278; total for July, 1917, 425 permits, value $762,604; total first seven months, 1918, $4,835,290; first seven months, 1917, $4,087,782; permits for dwellings, July, 1918, 111, $272,200; permits for dwellings, July, 1917, 87, $209,800; permits for dwellings during first seven months of 1918, 641, $1,611,075; permits for dwellings during first seven months of 1917, 530, $1,328,875; permits for factory buildings and warehouses, July, 1918, $466,000; permits for factory buildings and warehouses, July, 1917, $151,200; permits for factory buildings and warehouses during first seven months of 1918, $1,702,950; permits for same class of buildings corresponding period 1917, $1,305,050.

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What Missouri Offers in Stone

MISSOURI stands ninth among the states in the value of its mineral output; has a greater variety of commercial minerals than any state in the Mississippi Valley; stands first in the production of lead, zinc; second in barytes; is one of the two chief centers in the manufacture of fire brick; is an important manufacturer of lime and Portland cement; has mines producing the semi-rare metals, cobalt, nickel and tungsten; is an important producer of pyrites, used in the manufacture of sulphuric acid; ships marble throughout the United States for interior decorative purposes, and has large deposits of coal and iron as yet undeveloped, according to an illustrated booklet just issued by the Geological Survey of the state.

Deposits of potash feldspar have been opened in Ste. Genevieve County, where the mineral occurs in irregular veins in the granite rock. Though idle at present three of these deposits have made commercial shipments, the material being used in the manufacture of pottery.

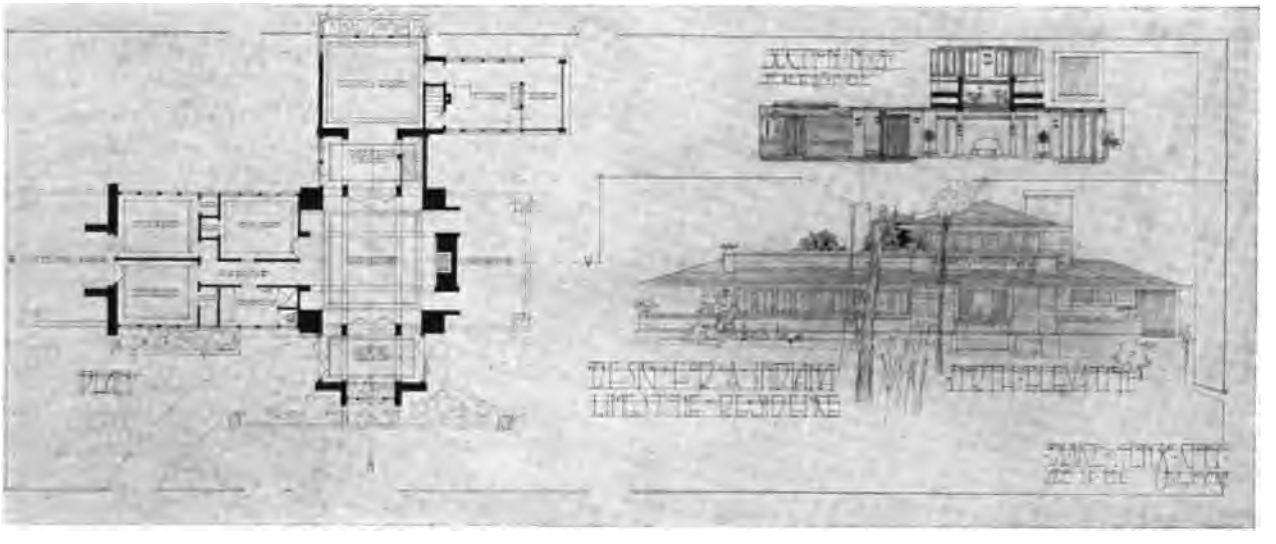
Missouri red granite is unexcelled for richness of color, strength and durability. It is quarried chiefly in Iron and Madison counties, although the area of granite rock extends over a number of adjoining counties, including Shannon, Reynolds, Carter, Wayne, Washington and St. Francois.

The granite is light to deep red in color, takes a high polish and shows an excellent contrast between polished and bush hammered surfaces. Blocks of practically any size can be quarried and dimension stone, free from flaws, can be obtained in unlimited quantities. Several million paving blocks are shipped annually from the quarry centers. The porphyry which occurs in the area of igneous rocks is broken into small blocks by numerous joints and is not suitable for dimension stone.

Missouri stands fourth among the states in the production of lime. Large plants are located at Ash Grove, Pierce City, Sarcoxie, Springfield, Louisiana, Hannibal, Glencoe, Mincke, Kimmswick, Glen Park, Brickey, Ste. Genevieve and Cape Girardeau.

An inexhaustible supply of pure limestone is available from the Burlington, Kimmswick and Spergen formations in the southwest, central and northeast and southeast parts of the state. The plants operated in southwest and northeast Missouri secure the raw material from the Burlington limestone, those near St. Louis and in southeast Missouri other than at Ste. Genevieve use stone from the Kimmswick, while the plants at Ste. Genevieve use oolitic stone from the Spergen formation. All of these formations produce a pure high calcium lime; that from the Burlington and Spergen being pure white while the Kimmswick lime is slightly gray in color and cannot be used for finishing purposes.

Limestone suitable for structural purposes is widely distributed throughout the state although the chief quarrying districts producing cut stone are at Carthage and Phenix, in Jasper and Greene counties. The stone product of these two districts is a white, crystalline stone unexcelled in durability, strength and uniformity of color. The stone is obtained from the Burlington formation and in addition to being used for the construction of the finest exterior work is manufactured into a fine quality of gray marble equal to any on the market. This marble is now shipped throughout the United States for interior decoration. The new State Capitol, the interior and exterior of which is con-



DESIGN FOR A LIMESTONE RESIDENCE

Remarkable Work of a Fourteen-year-old Boy, Bruce Goff, in the Office of Rush, Endacott & Rush, Architects, of Tulsa, Okla.

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structed from the Carthage-Phenix marble, stands as a monument to the beauty of this stone.

The Kimmswick formation at Cape Girardeau furnishes an excellent crystalline white limestone that has been used extensively in the local markets. Excellent stone occurs north of Ste. Genevieve in the Spergen formation. These ledges have not been quarried extensively.

Large crushing plants are located in all parts of the state, the output being used for road work, railroad ballast and concrete. At a number of the plants the fine material is pulverized for fertilizer.

Many of the large caves which occur throughout the Ozark region contain deposits of onyx. The industry is entirely undeveloped although large blocks of pure and tinted onyx can be obtained. In a cave in Camden County, west of Linn Creek, one pillar of onyx has a diameter of 45 feet and a height of 40 feet. This occurrence indicates the size of some of these cave deposits.

Sandstone suitable for building purposes has been quarried extensively near Warrensburg, Johnson County; DeWitt, Carroll County, and Ste. Genevieve, Ste. Genevieve County. Local quarries have been operated at many other points in south Missouri, especially in Dade, Bates, Barton, Vernon and Cape Girardeau Counties. At Liberal, Barton County, extensive deposits of asphaltic sandstone occur which have been quarried chiefly for flagging. Asphaltic sandstones also occur in Vernon, Cedar, Lafayette and other west Missouri counties, but they are generally too friable for structural purposes.

The most important quarries in the state, located at Warrensburg and DeWitt, are opened on what are known as channel sandstones of the Coal Measures. These are deposits of exceptional thickness and contain must excellent stone. The St. Peter sandstone is too loosely cemented to be used for building stone.

Marked Gains in Limestone for Flux

The production of limestone used for flux in the United States greatly surpassed even the record production of 1916, showing an increase of 1,743,920 long tons, or 7 per cent., in quantity and of $4,561,103 in value. These increases followed increases of 24 per cent. in quantity and 44 per cent. in value in 1916, and of 24 per cent. in quantity and 23 per cent. in value in 1915. The average price in 1917 was 73 cents a long ton, compared with 59 cents in 1916, and 51 cents in 1915.

Production in 1916 was reported from 33 States; in 1917 from 34 States, Nevada reporting production for the first time. In 1917, as in 1916, five States produced more than 1,000,000 long tons, Alabama rising above that figure and Illinois falling below. Five States exceeded $1,000,000 in 1917, whereas only three exceeded that value in 1916.

Of the 22 States whose individual production is shown in the tables compiled for the Government by G. F. Loughlin, 9 showed decrease in quantity but only 3 showed decrease in value. The 9 States whose quantity decreased included Pennsylvania and New York in the East, Wisconsin, Illinois and Kentucky in the central region, and Colorado, Montana, Utah and California in the West. Pennsylvania fell below the 10,000,000-ton mark, which it passed in 1916, but its output was still more than double that of the second State, Ohio, and nearly three times that of the third State, Michigan. The combined increase in quantity for Ohio and Michigan was nearly four times the combined decrease of Pennsylvania and New York. New York's output had also decreased in 1916. The three Central States, Wisconsin, Illinois and Kentucky, though showing a decrease in production in 1917, were still far ahead of 1915. Only a small part of their decrease in 1917 was offset by gains in adjacent States, but their total loss was less than 10 per cent. of the gains of Ohio and Michigan, which can supply the same markets in the Great Lakes region. The combined decrease of the four Western States mentioned was nearly double the gain made by other Western States, and the loss of Montana alone (208,910 long tons) was more than 50 per cent. greater than this gain.

The States showing the most striking increase were Ohio, New Jersey and Maryland in the East, Tennessee and Alabama in the South, Michigan and Indiana in the central region, and Arizona and Washington in the West. Maryland, whose output rose from less than 5,000 long tons in 1915 to more than 146,000 long tons in 1916, made a further gain of 22,256 long tons in 1917, and its value passed the $100,000 mark. West Virginia, which passed the 1,000,000-ton mark in 1916, made a further gain of 299,194 long tons in 1917, and the value of its output passed well beyond $1,000,000. Alabama produced more than 1,000,000 long tons, and the value of its product exceeded $1,000,000 for the first time. Michigan gained 541,932 long tons in 1917, continuing her steady increase in output since 1913, the year in which this industry was begun in the State. Arizona and Washington more than doubled the quantity and value of their output in 1917.

According to the Iron Trade Review the production of pig iron in the United States for the first half of 1918 was 5.6 per cent. less than in the corresponding period in 1917, a reduction which indicates what may be expected of the fluxing industry for the first half of 1918.

Tearing Down Granite Buildings

The Buffalo newspapers announce that the city's original skyscrapers are to be torn down and replaced by more modern structures. These "skyscrapers" are four-story buildings of granite and iron, erected sixty years ago, and they have housed many distinguished tenants. One of the newspapers says: "Time was when Buffalo folk "pointed with

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pride" to these substantial buildings, when they took visitors to see them and directed attention, rather boastfully, no doubt, to their "towering height" and incombustible construction. Little did they dream that within a comparatively short time these structures, of which they were so proud, would have outgrown their usefulness. But every building, like every dog, has its day. These structures have had theirs. Buffalo has outdistanced them. They have slipped into the business discard. They lag superfluous on the stage of time. So the order has been issued to raze them. Soon they will be merely a memory, simply that and nothing more."

Because the buildings are of granite, they are just as staunch and sound as the day they were erected. When stone buildings are torn down it is only because something larger and more modern is needed, and not from any structural defects.

Marl Production Shows Increase

The marl sold for agricultural use in the United States in 1917 amounted to 73,900 short tons, valued at $165,223, compared with 58,088 short tons, valued at $144,768, in 1916, an increase of 25 per cent. in quantity and 13 per cent. in value. The average price, however, unlike that of nearly all other commodities, decreased from $2.32 to $2.21 a ton.

Of the total output, 47,914 tons, valued at $112,075, or $2.35 a ton, was fresh-water marl, a calcareous ooze consisting mainly of an accumulation of small shells formed of carbonate of lime and of minute crystals deposited from the same material by the action of bacteria. This output came from nine companies—three in Virginia, two in California and one each in New York, Pennsylvania, West Virginia and Arkansas. The production in 1916 was 48,447 tons, valued at $126,345, or $2.60 per ton, and was made by seven companies—three in Virginia and one in each of the other States named except West Virginia.

Marine marl, derived from fragments of marine shells, loose or partly consolidated, was produced by five companies in the Coastal Plain region of North Carolina and South Carolina, the output amounting to 25,986 tons, valued at $53,148, or $2.35 a ton, in 1917, compared with 9,641 tons, valued at $18,423, or $1.91 a ton, in 1916.

A War Memorial Cloister

One of the finest sites in London, facing the Houses of Parliament and the Victoria Tower Gardens, is about to become vacant. It is said that there is a plan for erecting a tall building that would dwarf Henry VII's Chapel. There is another scheme, commended by a correspondent of the *Times*, for making a worthy use of it—to build on the site a cloister or Campo Santo, where could be placed monuments for which there is no longer any room in the Abbey itself. Our modern way with memorials (says the writer) is to set up something perfectly useless and meaningless, and so perfectly ugly. But a cloister would be a place of peace in the midst of a busy town; and it might easily be a place of beauty. If it were well designed, so far from

First Presbyterian Church, Greensburg, Pa.

Architects: Cram & Ferguson, Boston. Cut Stone Contractors: Hoosier Cut Stone Company, Bedford, Ind. Trim of Indiana Limestone

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marring the Abbey it would improve it. What is needed on that site is a low building, and a cloister is the lowest building possible. It could be connected with the Abbey at Poet's Corner with a very little contrivance; there would be no need to tamper with any part of the Abbey, still less to conceal any part of it now seen; and there is room enough on the site to make a cloister not much smaller than the Campo Santo at Pisa.

Graphite from Madagascar

The estimated production of graphite on the Island of Madagascar in 1917 was 35,000 tons, and the exports amounted to 27,838 tons, of which 16,506 went to England and 17,332 tons to France, writes Consul J. G. Carter, from Tananarivo. Although no direct shipments have been permitted to go forward to the United States, it is understood that 8,000 tons reached that country from Marseilles in 1917, and a considerable quantity has also been shipped from that port during the present year, principally through a consortium of French firms which, up until now, has controlled the bulk of the output of Madagascar graphite other than that shipped to England. Inasmuch as the French firms belonging to this consortium are represented in Madagascar, it is not unlikely that they will endeavor to control such graphite as may be now shipped to the United States direct from the island, while it would appear that various independent producers are endeavoring to form direct connections with the American importers. With the present state of the industry it is not believed that large quantities of the 1918 production of graphite will be available for shipment to the United States. On the other hand, some 10,000 or 15,000 tons of graphite are said to be remaining in the colony from the 1917 production, and may be available for exportation to America.

Limestone and Onyx Caves

TO the explorer who seeks variety of experience, one of the most fascinating lines is that of cave exploration. Throughout our western country there are many interesting caves that await discovery, and others that have been but partially explored, but no section offers a better opportunity than the limestone region of Kentucky, writes Le Roy Jeffers, F.R.G.S., member of the Explorers' Club.

Longest known and most often visited, the Mammoth Cave of Kentucky is still somewhat inconvenient of access, but it well repays the journey for all who seek acquaintance with the subterranean world. Since 1842, when Stephen L. Bishop, the first explorer of the cave, wrote his name and the year at the end of every lead which he followed, 152 miles of passageways, comprising 256 avenues, have been discovered.

Revisiting the cave in 1917, I secured the services of a descendant of the original explorer, and we set out for the most interesting and little known passageways. Here the footprints of early explorers lay undisturbed for many years, and we found several of the hollow sticks having burnt ends that were used by the Indians as torches. There is no evidence, however, that the Indians penetrated for any great distance. All the passageways of the cave are the water-worn channels of former days, and Echo river still lingers, often rising with such amazing rapidity that parties which have drifted on its surface are unable to return by the same route an hour or two later. Apparently no water has recently flowed through the passageways which the Indians visited, for, had such been the case, a deposit of mud would be found in their hollow torch sticks. The present inhabitants of the cave are big rats whose tails leave their trails in the sand, beetles, white crickets, eyeless fish, and crabs.

Often the passageways are very narrow and winding, as in the Black Chambers, while in many of the never used smaller ones there is barely room to wriggle forward by inches, pushing one's lamp before one. In certain sections of the cave one may find a labyrinth of passageways, in some instances five levels being one above another. I was able to explore one of these, in a distant section of the cave, which had been considered inaccessible, owing to the inconvenient height of its entrance.

The Mammoth Cave is unique in the width and height of its great chambers, and in its vast pits and domes which were hollowed out by the swirling water. Some of these are between 200 and 300 feet from top to bottom, by far the finest being Cathedral Domes which are far distant from the usual routes of travel. Discovered about sixty-five years ago, they were lost for fifty years, being rediscovered by my guide in 1908. There are four adjoining domes probably at least 250 feet in height and 30 to 40 feet in diameter. Their walls are of fluted limestone in horizontal and vertical layers from which water is dripping. Brown and slimy with mud, they are impossible to climb unaided by ladders, so that the openings far up their sides must remain for the present unexplored, and the domes themselves terminate the cave in this direction. Instead of being very rarely visited, Cathedral Domes should be accessible to any seriously minded tourist.

Men are occasionally lost in the cave by becoming tired at the slow progress of their party and starting off on their own account. After a little they become

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confused amid the multitude of passageways, wander around for hours until their lights go out, and then spend the night in darkness and fear, shouting until they are rescued. Some years ago four men left their party, and, failing to appear, my guide went after them at seven in the evening. He had already had a hard day's work in the cave, but he searched until one in the morning before he heard their calls. They had only one light left, which was nearly burned out, and they were well scared. After their rescue one of them said, "This man saved our lives, I move we each give him a dollar."

Distant about three miles northeast of Mammoth Cave is the Great Onyx Cave, discovered about two years ago by its present owner, Mr. L. P. Edwards. Walking through the beautiful Kentucky forest, filled with a multitude of little birds, and Bob Whites cheerily whistling, I reached the farm house of Mr. Edwards toward evening. Practically unknown and unvisited, this cave is the finest of its type with which I am acquainted. Its known passageways take about three hours to view and are everywhere of the most surprising interest and beauty. This was a sealed cavern until its recent discovery, and its exceptional formations are uninjured by tourists or by smoke.

Entering the cavern, one passes through a chamber in which a fairy forest of stalactites and stalagmites is growing. Often they join to form a massive column 12 feet in height that seems to support the roof; again the diameter of the column is only that of a pencil. It is said that the gradual dropping of water adds the thickness of a wafer to such formations in five years. The smoother portions of the roof are plastered as if by hand with plate gypsum, white and sparkling as the purest snow in sunshine. Fringes of tiny stalactites like icicles run here and there over its surface and occasional clusters gather in rich profusion. Other ceilings closely resemble new brown maple sugar. Beyond are transparent shawl-like draperies that suggest strips of bacon when a light is placed behind them.

As we penetrate the most distant portions of the cave the gypsum formations increase in beauty and wonder and we find many varieties in active growth. Here the roof is laid with fiber gypsum, finer and softer than cotton; there the walls are covered with needle gypsum resembling angora fur, or the formation is feathery like frost flowers upon the mountains. Cauliflowers are abundant, while the ceiling is often covered with gypsum snowballs which are budding and blossoming into flowers until there seems to be a great garden above one. Elsewhere the gypsum is peeling away in waxlike plates to give place to a younger growth.

Some of the more delicate alabaster formations are of a lime-grape appearance, while others have coverings as white as snow. Possibly the most marvelous are the alabaster helectites which are a curious twisted form of the stalactite. In the limestone rock of the ceiling there are tiny tracks along which the water found its way, and its gradual dripping at slightly varying points is supposed to have formed these helectites, which grow in every direction, regardless of gravitation. Great clusters of white, yellow and brown flowers and fruit hang invitingly above one, or one may fancy he sees in them many varieties of mosses and seaweeds.

So beautiful and so perfect are these formations in the Great Onyx Cave that one feels it should in some way be taken over, together with Mammoth Cave, by the Government and administered by the National Parks Service for the benefit of the Nation.

Decrease in Italian Marble Production

The war has worked to the disadvantage of Italian marble production. The cutting off of export markets, the scarcity of tonnage and the high freight rates, the congestion of the Italian railways and the labor problem have all been factors in decreasing the quantities mined. The following figures show the number of metric tons shipped from Carrara and Massa, the most important centers of Italy, during the period 1913 to 1917: Carrara, 1913, 245,660 tons; 1914, 207,001 tons; 1915, 110,850 tons; 1916, 101,015 tons; 1917, 69,071 tons. Massa, 1913, 51,250 tons; 1914, 44,117 tons; 1915, 25,120 tons; 1916, 31,722 tons; 1917, 9,131 tons. The United States was one of the leading customers of the Italian quarries, and the recent placing of an embargo against the importation of marble and stone will probably cut the figures of production for the current year much lower.

ROCKFACE ASHLAR WITH CUT STONE TRIM

Residence of Walter S. Dickey, Kansas City, Mo. Trim of Napoleon Gray Marble by the Phenix Marble Co., Kansas City. Ashlar of native stone

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Architects and Contractors

IT has been conceded for a number of years that the building industry and allied industries throughout this country are the most important lines of business, vitally affecting the home and the general public, and requiring the investing of a greater amount of wealth than in any other line of business, because it affects the physical safety of the people, said Bert D. Kech, vice-president of the North Dakota Association of Architects, in an address at a recent meeting of the North Dakota State Association of Builders' Exchanges. Therefore those assuming to practice architecture, having these grave responsibilities, should be required to have certain qualifications so that the general public and those who are engaged therein may be assured that they are competent to be entrusted with the planning and designing of buildings.

The wide-awake architect realizes that a great many of the difficulties arising between the architect and builder and between the builder and the owner, and between the owner and architect, is from incomplete and ambiguous plans and specifications, the cause for which there are many reasons.

While we acknowledge that we have seen plans and specifications used for building construction which were very incomplete and caused friction between the architect and owner, as well as architect and contractor, and contractor and owner, yet there are other reasons for friction and disagreement.

We agree that it is best for the architect and the contractor or builder to co-operate, and to have honest co-operation means that the owner will not suffer, and that his interests will be looked after in a much better manner and better results obtained without friction, without damage or injustice to either or any of the parties concerned.

This being the aim, it is necessary for all parties to co-operate. With the architectural profession being placed on the plane where it belongs, and more complete plans and specifications, and a more definite understanding between the architect and builder as to honest co-operation, "because without it the owner will suffer," and with contractors to do the building, who are thoroughly conversant with all lines of the trades and have sufficient and thorough organization to execute the work, with manufacturers and material dealers giving their best efforts, and co-operation in execution of the work, even though under sub-contract, the desired results can be obtained in the finished building without friction, and all concerned can take just pride in the completion of the work.

There are so many subjects that require a more definite understanding between the architect and contractor, and not reach out into the manufacturers and building trades that time will not permit their discussion at this time.

In years past the drawings and specifications and the services of the architect were crude in comparison to the services required of the architect today. Steel and reinforced concrete have made possible the large fireproof buildings, and the large high buildings necessitate the electric elevators. Electricity, with its wonderful complications, has changed the entire problem of light and power. Telephone systems, ventilating, mechanical equipment, heating, refrigeration, sanitation and many methods of construction, including new inventions for convenience of occupants for the dispatch of business, and safety of the people who occupy the building, are many.

The architect today must necessarily know something of all of these subjects. The drawings and specifications, by reason of all these problems involved, must necessarily be complicated and accurate. As the work of the architect has developed along these lines, the usefulness and field of the contractor has assumed greater importance. Greater responsibility has fallen upon the shoulders of the contractor in recent years, which requires greater organization, as well as familiarity with the various types of construction and subjects, to be able to execute the complicated plans and specifications required for building construction.

As building operations progressed, the working relationship between the architect and contractor was, in years past, outwardly friendly, but at heart they were to a certain extent not friendly. The architect, in some instances, felt that the contractor was trying to avoid his contract obligations, and the contractor felt that the architect was after him to do more work than he contracted to do. There was lack of honest co-operation.

Possibly the plans and specifications were not as complete as they should have been, and perhaps the contractor's paramount idea was the profit that would result from the building operations.

There is positively no excuse for this condition. I believe a contractor can be friendly and co-operate with an architect without jeopardizing the interest of the owner, and I believe it is possible for the architect to be friendly and co-operate with the contractor, and still look after the interest of the owner. Necessarily they come in contact and the best results can be obtained by co-operation. Do not understand me to infer that co-operation is going to eliminate all the difficulties that arise between the architect and the contractor, because the architect must first see that cause is not given for any misunderstanding; likewise, the contractor, to see that nothing is done which will cause misunderstanding.

For many years the architect has been imposed upon

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by the prospective client, requesting the architect to do considerable work for which he receives nothing, unless the building is actually constructed, and a great many put their time in on this kind of work, and neglect development of the work which actually brings a commission. For this condition, of course, the architect is to blame, but which practice must be discontinued.

I believe there is a great work to be done for the architects, contractors, manufacturers, material dealers, the coming season through co-operation. We could not be loyal to our country and not take an interest in stimulating building construction. We realize that building materials are a little higher now than they were before the war began, but we also know the conditions that exist, and we can calculate the conditions that will exist after the war closes. This information and the benefit of our judgment should be passed on to the general public, who contemplate building construction.

A great army of labor and craftsmen from all trades, and a great many manufacturing institutions and dealers in all lines of building construction work and materials will be out of employment, and business will be nil, if the idea is allowed to prevail that building materials and labor are so high that it is not good business to build at the present time, but must wait until the war closes.

It is an erroneous idea, and I can see that those who are familiar with the situation should enlighten the general public to the extent that the building industry shall not be stunted until after the war closes. This should be done from a patriotic standpoint.

Our country cannot carry on this great war for which we are spending so much treasure and blood and have one of its principal institutions out of business, from which source it expects to receive great returns in the way of investment in bonds, taxes and revenue, which would accrue from the labor of all that are connected with the building industry.

If these facts can be brought to the attention of those who are contemplating, or have under their charge, the construction of buildings which are necessary, including homes, public buildings, schools, banks and other institutions, and inform them that to carry out their building operations would be to assist the Government in the prosecution of the business at hand, as well as being a good business proposition for themselves for several reasons.

One familiar with the situation will know that a great many building projects have been held back on account of the advanced cost of material and labor, which we are positive will never reach the low level that they were previous to the war.

Should the war close, buildings, which have been held back on account of conditions, will go ahead in addition to the normal amount of building always required, which will require material and labor. This, in itself, will stimulate prices, or, at least, hold them to their present level.

There is also the fact that it is going to take an enormous amount of material and labor to fill the Government contracts which will take a number of years to complete. Also there will be a reconstruction period in foreign countries now at war, where the destruction has been enormous, as well as other foreign countries to the south of us, where we have been reaching out into markets heretofore supplied by foreign countries,

Taking everything into consideration, it is not likely that the cost of building construction will ever descend to former values. If anything, the war closing would tend to raise the price, after the Government has released its control over steel and iron, which naturally affects building construction in various lines.

Buy Bonds and Nail This Lie

A writer in the *Norddeutsche Allgemeine Zeitung* made the statement recently that American soldiers cannot be properly equipped because "the American manufacturers of war-material are swindlers." Of course, every statement which comes out of Germany concerning America and American troops is but one more indication of Germany's fear of the United States; one more indication of the realization that it is the added power of the United States which has beaten them. Yet of all the false statements which have emanated from German sources, this should have peculiar interest for the American citizen at this time of a new Liberty Loan campaign.

Americans, whatever may be their faults, have been counted the world over as pretty shrewd business men. But if there is anything which the shrewd business man does not do it is to place contracts with swindlers; if there is anything the shrewd business man does not do it is to supply money to go into the pockets of swindling contractors. On the Third Liberty Loan, 17,000,000 Americans subscribed upward of $4,000,000,000—for the purchasing of war-material. A pretty conclusive bit of evidence as to the confidence of American business men in the American business man!

In this, the campaign for the Fourth Loan, America will have the opportunity of re-confirming the above judgment, and, since the Loan is for double the amount, the opportunity of double-nailing the *Allgemeine's* lie.

Every Liberty Loan dollar will be an integrity dollar, reaffirming, not merely our America's faith in the integrity of American manufacturers, but reaffirming also America's faith in itself, and its Will to Win.

The List of Restricted Imports No. 2 (item 121) has been so amended, under a new ruling of the War Trade Board (W. T. B. R. 198) as to permit the importation from Italy of Italian marble and manufactures of Italian marble when coming from convenient ports where loading can be done without delay.

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STONE

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THE report issued by the New York State Industrial Commission shows that manufacturing activity in the state reached new high levels in July. Although July is invariably a less active month than June, both the total number of persons employed and the aggregate wages paid made new records for the month, despite vacations and shutdowns. The stone, clay and glass industry, however, is in a backward condition in comparison with June of this year and with July of last year. The number of employees decreased two per cent since June and sixteen per cent since July, 1917. In this group there are 73 establishments, with 13,492 employees.

A NUMBER of cities in Great Britain have already begun to plan memorials to the dead heroes of the great war that shall be worthy of the devoted sacrifice the country and its manhood has made. While there have been individual memorials without number in the form of shafts, tablets, fonts, stained glass windows, and the like, it seems to be the opinion that the general war memorials erected by towns and communities shall take a form other than the usual monuments or statues —in other words, that gratitude, grief and remembrance shall express itself in a notable and permanent structure. The Pantheon of ancient Rome naturally suggests itself as to what might be done by a nation at large, while cities are discussing chapels, cloisters, hospitals and public buildings devoted to various uses. In this country the city of New York is considering some sort of worthy memorial to the late John Purroy Mitchel, to mark not only his gallant self-sacrifice, but also his services to the community as a public official. America's part in the war has but just begun. Our list of casualties, distressing as it already is, must inevitably grow much longer. We shall be called upon to commemorate many heroes, and we shall do it in a manner commensurate with our wealth and the proud place we have taken in the councils of the nations. By our memorials to Washington, Lincoln, Grant and McKinley; the shafts and statues we have erected on noted battlefields, and the soldiers' and sailors' monuments to be found in almost every city, town and hamlet in the land, we have disproven the adage that republics are ungrateful. When peace comes we shall give freely of our wealth and tender thought to carry along to future ages the proud achievements of those who have made the supreme sacrifice. Whatever may be done by communities, it is to be hoped that there will be some great and glorious national Valhalla in which shall be enshrined for all time the name and fame of our heroes.

Stone and Coal

Aside from the general curtailment of building and the lack of transportation facilities, the great problem that confronts the stone producers to enable them to tide over the period until normal times are restored is the fuel stortage. Even if quarry production is largely reduced, the operators will require a considerable amount of coal unless they wish to see their organization entirely broken up. In many quarries pumps have to be kept running all the time, or the pits will fill with water and great loss be faced. There is also the necessity for stripping in order that needed development work be not interrupted. From the very nature of his business the quarryman has no temptation to stock an unnecessary amount of fuel. Even under usual conditions the quarryman gets out his stone for particular jobs and does not store his banks with miscellaneous blocks awaiting a customer. In these days of high cost of labor and supplies no one would think of quarrying stone beyond immediate and imperative needs. The demand for stone cannot be stimulated by any artificial means, as is the case with many commodities. For these reasons there is little need to place a close fuel embargo on the stone industry. It is extremely unfortunate that the fuel outlook is not more promising. The trouble is both as to the production and transportation of coal. In order to free cars to move the fuel output, sand, gravel and stone, except when used strictly for war purposes, have been put on the transportation embargo.

While in the production of both anthracite and bituminous coal the country is considerably below the program set by the United States Fuel Administration as marking a minimum at which the necessary war work could be carried on at the rate of highest efficiency, the fact remains that coal production has reached a higher point than ever before in the history of the industry. In a great many districts, both anthracite and bituminous, production records have been broken, but still production remains short of requirements by several million tons. Almost daily applications are coming to the United States Fuel Administration from

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War Industries for allotments of coal in addition to those made at the beginning of the coal year. Some are from new plants authorized by the War Industries Board, not known to the Fuel Administration at the beginning of the year. The requirements for these plants are in addition to the original allotments. Other demands are from plants already on the Preferred List of war industries for increased allowances because of enlargements and extensions to original plants, made since the Fuel Administration complied its estimates of consumption. The increased demand for coal for the navy reached almost 100 per cent in July, and is likely to reach 200 per cent by the end of the year. With the launching of new ships the requirements of the Shipping Board have likewise grown beyond all expectation, and new industries are making great demands.

The National Government is endeavoring by every means in its power to stimulate the production of coal. Although the ranks of the mine workers have been depleted by the war, those who remain at work have been doing their part nobly. They are taking fewer holidays, and men who long ago retired have gone back to active work. The coal operators have been urged to practice the highest degree of efficiency as to mine management and equipment.

A new step is the appointment of production committees in every mine, whose duties are to see that all the mine workers who can work do their full hours of work each day, six days a week. At the same time, if mine workers are unable to work because of the inefficiency of the operator, the committees are to report that so that the United States Fuel Administration can place the blame, if there is any, where it belongs.

With every effort bent to improve the coal situation, much will doubtless be accomplished. The stone industry is one of the great activities of the country, and there is no question that its demands for an adequate supply of fuel to enable it to withstand the disintegrating effects of the great war will be given careful consideration. At the same time it is more essential than ever that the stone men stand loyally together and work in the utmost harmony.

THE War Industries Board has placed new school buildings in the non-essential class, and has denied the application of the New York Board of Education for approval of plans calling for new construction involving an expenditure of approximately $9,000,000. This order means that no new school buildings may be erected anywhere in this country for the duration of the war, except where the new buildings are intended to replace those already in use and which are beyond repair. At the close of the last school year in June, there were 60,000 pupils on part time in Greater New York. Allowing for the natural increase in the city's population, it is estimated that fully 20,000 additional pupils will seek admission to the schools at the beginning of the coming term. To take care of these, and also to allow the part-time pupils to be accommodated, the New York Board of Education had planned the erection of seventeen new school buildings in the different boroughs, and fourteen additions to buildings already in use, at an estimated cost of $8,305,935. It was figured that all of the additional room would be needed by the time the buildings could be completed. While this action is necessary in order not to impair our war efficiency, it will work a very great hardship, not only in New York city but also throughout the entire country. The reports from various sections show that a large amount of school building had been planned, and this will all have to be postponed until the declaration of peace. When normal times are restored there will be such a resumption of building activity that the industry bids fair to be swamped. It is not only the building trades that will be affected, but also the material men as well. The unfortunate part of it all is that with building so generally curtailed, the organization of the industry will be imperilled, and it will be an arduous and delicate task to put it on a firm footing again. Still the Americans never flinch from a hard problem, and the fruits of victory in the war will be worth every sacrifice we must make.

Cut Stone Cheaper Than Terra Cotta

The contract for furnishing cut stone for the new isolation hospital in Grand Rapids has been awarded to F. H. Hirth, of Grand Rapids, Mich. In commenting upon this fact, the local newspaper says:

"It has been found in comparing bids that terra cotta, which was specified for certain work, is higher than cut stone. Since the war started terra cotta has been advancing in price steadily, while stone prices have changed very little."

Mention has been made more than once in these columns of the fact that cut stone has kept its price at the level maintained before the war more nearly than almost any other material of construction. When it is considered that stone is the choicest and most durable of building materials and that it does not need repairs or replacement, it yields to nothing else that can be used in the matter of economy.

Sand, Stone and Gravel Made Non-Essential

Sand, gravel and stone have been placed on the Railroad Administration list as non-essential, except when shipments are for war industries purposes. Open cars will not be available for the transportation of such commodities. Coal requirements of war industries, army, navy and merchant marine are such as to forestall the use of the open cars for other than commercial traffic. Orders have gone out from the Railroad Administration curtailing the use of open cars for stone, sand and gravel. There has been much opposition to

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the establishment of such curtailment rules, because it will tie up every sort of building activity, but officials believe it is the only method of staving off a winter shortage on coal cars.

By employing coal cars to the maximum at this time, the fullest production of the mines can be handled successfully during the winter, it is explained. While there is no evidence of a coal car shortage now, open car curtailment will delay it further, officials say.

To Develop an Industrial Center

A plan is on foot to develop a great industrial center on the south shore of the Spring Gardens, at Baltimore. The proposition as it now stands is to purchase the waterfront of the Anne Arundel Sand and Gravel Company. This frontage is about two miles. An offer of $2,000,000 for the property has been rejected. Its sale would not interfere with the dredging operations of the Maryland Dredging Company, whose chief interest is dredging gravel from the bottom of the middle branch of the Patapsco River. The details, as far as they have gone, call for piers and a shipbuilding plant. It was also said that the Federal Government is favorably inclined toward the proposition.

Importation of Italian Marble Permitted

The List of Restricted Imports No. 2 (Item 121) has been so amended, under a new ruling of the War Trade Board (W. T. B. R. 198), as to permit the importation from Italy of Italian marble and manufactures of Italian marble when coming from convenient ports where loading can be done without delay.

Memorial Chapel at Greenbush

A stone-trimmed chapel, the Van Valkenburgh Memorial, is being erected in the cemetery at Greenbush, N. Y. The plans are by Architect H. P. Weber, of Albany, and the contractors are Bame & Pardell, of Albany. The chapel was provided for in a clause of the will of the late Harriett Van Valkenburgh, of Rennsselaer. It is a memorial to her parents.

Business Brevities

The Granite Sand & Gravel Company has bought a tract of land in Wayne Township, Ind., with gravel deposits, for $27,673.42, and will develop it.

The lime plant of the Knoxville Sand & Transportation Company, at Asbury, Tenn., near Knoxville, was destroyed by fire the past month. The plant, which is about halfway between the quarries of the Gray Eagle and the Asbury Marble companies, has been in operation for about two years. Plans for rebuilding are already under way.

The city of San Diego, Cal., has rented a rock crusher and installed it near the city. Large quantities of rock will be crushed for highway work.

A trust deed to secure a bond issue of $120,000 issued by the Southern California Rock & Gravel Company has been filed in Los Angeles County. The property covered by the deed consists of leases on large tracts of land in the Rancho Azusa de Duarte, in Los Angeles and Ventura counties.

A factory for making electric insulating material from mica has just been started in Gotenborg, Sweden, by John R. Rettig & Co. (Ltd.) The company has its own mines in the Bohuslän District, where there are large quantities of raw material, and it is hoped that the production of mica can be increased to supply the entire needs of the country. Possibly the material will also be exported.

The rock-crushing plant on the Lower Otay dam construction work, near San Diego, Cal., will be enlarged. The work has been delayed owing to lack of capacity of the crusher.

Conklin & Sons Company, of Madison, Wis., dealers in stone, gravel, etc., have increased its capital stock from $200,000 to $250,000.

The Waukesha, Wis., Lime and Stone Company has filed an amendment to its articles of organization.

Luther Lindauer, who operates a quarry in Kaukauna, Wis., has furnished a large proportion of the stone used in road construction in that section this summer.

The shed of the Claremont Cut Stone Company, at 1624 Webster Avenue, New York, was injured by fire the past month.

Fifty laborers in the quarry of Harry E. Bester, at Hagerstown, Md., struck for a wage of 40 cents an hour, the past month.

Limestone and Sandstone

The West Virginia State Supreme Court of Appeals has affirmed the decision of Judge John M. Woods, of the Berkeley Circuit Court, in directing a verdict in favor of the defendant in the damage suit of Daniel M. Keller, of Martinsburg, against the Blair Limestone Company, of Berkeley County. Keller, a Baltimore & Ohio Railroad brakeman, sued for $25,000 damages for alleged permanent injuries received while placing coal cars at the Blair quarries, claiming negligence on the part of the limestone company.

The Oregon State Emergency Board made a grant of $5,000 to the state lime board for the state plant at Gold Hill. While this is not sufficient money to fully complete the plant, it can be put in operation and money obtained through the sale of lime to finish the plant. The demand for lime is particularly urgent at this time because of war conditions.

Agricultural lime has been placed in preferred classifications in the matter of fuel supply as well as in the matter of transportation. This was done at the request of the Department of Agriculture, acting upon the recommendation of the agricultural advisory committee, in session at Washington, recently. The advisory committee declared that production and distribution of pulverized limestone and burned lime for agricultural purposes should be declared essential in the production of food and other war necessities, both indirectly through the clovers and directly through many staple crops, such as wheat, corn and cotton. The classification should bring relief to farmers. Reasons given by the agricultural advisory committee for urging that lime be placed on the preference list were that the prices of lime and limestone are now very high, that they were advancing before the war on account of the newly created demand on the part of farmers, and that now the high cost of labor and fuel has made further heavy increases.

Marble and Granite

The Sam S. Shubert Memorial Theatre, on South Broad Street, Philadelphia, has just been opened to the public. The interior finish, including the stairway, is of pink Tennessee marble and black and gold Belgian marble. Herbert J. Knapp was the architect.

The city commissioners of Montreal are planning the road work which it is proposed to carry out next year, and

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although definite decision has not been reached, it is understood that the appropriations for new work which will be included in the budget will amount to about $400,000 and that this will be devoted to putting in proper condition the main approaches of the city. The southern approach from Victoria Bridge along Bridge Street will, it is stated, be entirely reconstructed, the present macadam pavement to be replaced with granite blocks at an estimated cost of $85,000.

Efforts to Close Quarry Fail

Ten years' effort by residents of Northeast Minneapolis to compel closing of the quarry and plant of the Minnesota Crushed Stone Company have failed again. District Judge Daniel Fish denied a petition of Martin H. Brede and others to enjoin the company from operating its plant at Johnson and Sixteenth streets, N. E. The quarry, the court held, was necessary, useful and being conducted with every care possible. The residents complained the quarry caused noise and dust.

Limestone and Rock Phosphate

The University of Illinois has threshed the wheat from its famous "Oblong field," a field whose basic soil is the same throughout, but treated differently in different parts, says a Chicago newspaper. The following table of yields on the different plats shows the comparative results of these treatments:

Soil treatment applied—	Bushels per acre
None (average of three tests)	8.8
Farm manure	15.8
Manure and limestone	22.7
Manure, limestone, rock phosphate	33.4
Crop residues	13.2
Residues and limestone	30.5
Residues, limestone, rock phosphate	36.1
Residues, limestone, phosphate, kainit	38.8

Manure, limestone and rock phosphate, a combination not at all beyond the reach of any good farmer, gives four times the yield per acre that can be secured from untreated soil, and more than twice the yield that is given by the application of manure alone. Surely, object-lessons like these are bound to tell.

New Companies

The Winchester Rock & Brick Corporation, of Portland, Me., to quarry and crush stone, manufacture brick, etc. Capital, $1,200,000.

The McConnellstown Sand Company, of McConnellstown, Pa., incorporated under the laws of Delaware, to quarry, manufacture and sell sandstone, limestone, slate and other materials. Capital, $50,000.

The Rock County Sand & Gravel Company, of Milwaukee, Wis., to quarry and deal in stone, sand, gravel, etc. Incorporators: Charles F. Schendel, Otto J. Krueger and Theodore C. Troemming.

The Bellevue Quarries Company, of Toledo, Ohio, to quarry and crush stone. Capital, $60,000. Incorporators: D. G. Slee and Richard D. Logan, both of Toledo.

Dean-Porter Stone Products Company, of Cleveland, to manufacture and deal in stone. Capital, $20,000. Incorporators: Robert A. Dean and Samuel Porter.

The Raeder Sand Company, of Canton, Ohio, to deal in stone, sand, etc. Capital, $25,000. Incorporators: L. D. Blanchard and R. C. Flack. The company owns 23 acres of land, southeast of Canton, and will install a spur track.

The Le Mars Gravel Company, of Le Mars, Ia., to deal in stone, gravel, etc. Capital, $600,000. F. A. Kenson, president; G. A. Long, secretary.

United States Decorative Marble Company, Inc., of Wilmington, Del., to manufacture and sell stone, marble, etc. Capital, $500,000. Incorporators: F. A. Armstrong, C. L. Rimlinger, B. A. Spangler, all of Wilmington.

The Mt. Pleasant Sand & Gravel Company, of South Seaville, Cape May County, N. J., to deal in sand, gravel, stone, etc. Capital, $50,000.

The Central Monument Company, of Chicago, to manufacture and deal in marble and granite. Capital, $2,500. Incorporators: Fred F. March, K. Kelly and William A. O'Melvana.

The Rush Run Sand Company, of Zanesville, Ohio, to deal in sand, stone, etc. Capital, $10,000. Incorporators: J C. Doughausen, Harry M. Flegal, Harry C. Shepherd, Edward R. Meyer.

Lime Companies to Aid War Supplies

Lime in any quantity needed for war purposes, such as the manufacture of steel, paper, glycerine, reduction of fats, or any one of scores of industries in which it figures as an active agent, will be supplied to the Government

COURTYARD AT WESTMINSTER, LONDON
The portion at the left dates from about 1350, A. D., and that at the end from about 1500, A. D.

from the Pacific Coast section on a moment's notice as a result of the organization at San Francisco of District No. 14, War Service Committee on Lime. Lime companies in California, Oregon, Washington, Nevada, Arizona and Idaho were represented at the meeting.

The State Will Finish a Contract

New York State will undertake to complete the link in State Route 30, between Spencerport and Brockport, a distance of seven and a third miles. The contract originally was let to the Newport Construction Company. Work was started in the spring of last year and half finished. Work stopped through the alleged failure of a Middleport concern to furnish crushed limestone as agreed, and the matter went into court. The state finally cancelled the contract.

Construction Notes

T. T. Redding, Fort Smith, Ark., has been awarded the contract for erecting a dormitory and dining hall at Galloway College, Searcy, Ark. The work will cost in the neighborhood of $150,000.

C. B. Keen, 1218 Chestnut Street, Philadelphia, is preparing plans for a $100,000 office building at Greensboro, N. C., for the Southern Life & Trust Company.

The Masons of Meriden, Conn., will build a four-story Masonic home, costing about $100,000, at Wallingford, Conn. The plans are by W. Arnold, Meriden.

All bids for the erection of the new high school at Bax-

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ter Springs, Ark., have been rejected, and it will be done by days' work. The architect is B. C. Overton, of that place, and the estimated cost is $100,000.

Grace Lutheran congregation, of Rochester, N. Y., has rejected all bids for the erection of a new church and postponed the project indefinitely.

The Sisters of Visitation, of Tacoma, Wash., will erect an academy and other buildings in that city, at a probable cost of $250,000.

The University of Tennessee, Knoxville, will erect an armory, costing about $150,000, and an administration building, costing about $50,000.

GATEWAY OF THE SUN, TOLEDO
An example of Moorish stonework in one of the oldest cities in Spain

Blackall, Clapp & Whittemore, 20 Beacon Street, Boston, have prepared plans for a $100,000 school building for the Young Men's Hebrew Association, at Howland and Warren streets, Roxbury, Mass.

The Bridgeport, Conn., Housing Company will erect a thousand dwelling houses for working men in that city, at a total cost of about $2,000,000. R. C. Sturgis, 120 Boylston Street, Boston, is the architect in charge of the development.

Greenville, S. C., is planning an addition to the municipal hospital, to cost about $130,000.

C. G. Poggi, Elizabeth, N. J., is preparing plans for a $250,000 dormitory and cafeteria for the Y. M. C. A. in that city.

The contract for the erection of a new high school at St. Petersburg, Fla., has been awarded to C. F. Thomas, of that city, at $142,421.

The Piggott-Healy Construction Company, of Hamilton, Ont., has been awarded the contract for the stonework for the Most Holy Redeemer College at Brockville, Ont. The building will cost about $250,000.

Joplin, Mo., will build a new city hall, costing about $85,000.

L. Sonntag, Newark, N. J., is preparing plans for a $500,000 public school in that city.

The Women's Missionary Society will build a $100,000 Deaconess Home at Des Moines, Ia.

The contract for the erection of a hospital for the Sisters of St. Joseph, at Grinnell, Ia., has been awarded to Lighter Bros., Cedar Rapids, at $96,391.

The Swenson Construction Company, Kansas City, Mo., has been awarded the contract for the erection of a stone-and-brick hospital for the Sisters of St. Mary, at Leavenworth, Kan. It will cost about $200,000.

The Congress Hotel, Chicago, will build a sixteen-story addition, costing about $1,500,000.

The contract for the erection of the new Clay County courthouse at Clay Center, Neb., has been awarded to the Olson-Magee Company, of that city. It will cost about $100,000.

J. C. Fulton & Son, Uniontown, Pa., are preparing plans for a $200,000 stone church for the First English Lutheran congregation at Johnstown, Pa.

The First National Bank, of Longview, Tex., will rebuild its banking building recently destroyed by fire.

J. M. Phillips, McKees Rocks, Pa., is preparing plans for a $150,000 school in that city.

The E. I. du Pont de Nemours Company will erect a stone-and-brick Y. M. C. A. building at Washburn, Wis., costing about $50,000.

R. J. Hotchkiss, Peoria, Ill., has prepared plans for an $80,000 school in that city.

The Bridgeport, Conn., Christian Union will build a four-story clubhouse, costing about $100,000, after plans by E. B. Caldwell, of that city.

The Congregation B'Nai Jacob, of Montreal, Can., will build a synagogue, costing about $80,000.

Stratton & Snyder, Union Trust Building, Detroit, are preparing plans for a municipal sanatorium in that city. It is expected to cost about $350,000.

A. D. & J. V. Brodericks, of Madison, Wis., have been awarded the contract for the new $100,000 Y. M. C. A. building in that city.

Cameron, Tex., is planning to build a $65,000 high school.

St. Stanislaus congregation, Chicago, will erect a $100,000 church on Lorel Street, in that city, after plans by Worth & Steinbach, 155 North Clark Street, Chicago.

The City of London, Ont., will soon receive bids for the erection of a hospital costing about $500,000.

Shattuck & Hussey, 19 South La Salle Street, Chicago, have prepared plans for a three-story Y. M. C. A. building, costing about $75,000, at Baton Rouge, La.

G. H. Rommel, Louisville, Ky., has been awarded the contract for the erection of the $150,000 Illinois Central Railroad hospital at Paducah, Ky.

The Tyler Street Methodist congregation, of Dallas, Tex., is planning the erection of a home, to cost from $50,000 to $100,000.

J. E. Fortin, 2161 Robinson Street, Regina, Canada, has completed plans for a $175,000 Roman Catholic church at Gravelbourg, Sask. It will have Indiana limestone trimmings. The general contractor is J. H. Tremblay Co., Sterling Bank Building, Winnipeg.

Perry & Fowler, Vancouver, B. C., are preparing plans for a $350,000 armory for the Dominion Government in Vancouver.

J. W. Lewis, president of the Industrial Savings Bank, Washington, D. C., will build a $125,000 hotel at Eleventh and U streets, in that city.

E. C. Gerhard, Post-Despatch Building, St. Louis, has been awarded the contract for the erection of the new $90,000 church for the Delmar Avenue Baptist congregation, in that city.

Ground has been broken for the long-prejected government cold-storage warehouse on West Thirty-ninth Street and Hogue and Seeley avenues, Chicago. The main build-

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ing will be 223x323 feet, and six stories and basement. The entire plant will represent an expenditure of $3,000,000.

W. C. Jansen, Electric Building, Cleveland, is preparing plans for a $125,000 parish school for St. Wendelius congregation, in that city.

The Fuller Land & Improvement Company, of Philadelphia, has purchased the property at 21 and 23 Central Avenue, Newark, N. J., and will erect a modern and substantial commercial building. The property now has an old-fashioned graystone mansion, which will be wrecked.

The First Christian congregation, of Independence, Mo., will build a $70,000 church, after plans by J. H. Felt & Co., Kansas City.

The contract for the erection of the new $120.000 building for the Virginia Military Institute at Lexington, Va., has been awarded to J. L. Crouse, of Greensboro, N. C.

J. Dominique, 237 Addington Avenue, Montreal, has been awarded the contract for the erection of the new church for the parish of Notre Dame de la Defense, in that city. It will cost about $143,000.

McGinnis & Walsh, 100 Boyleston Street, Boston, have prepared plans for the new Thorndike Memorial Hospital, to be erected on Harrison Avenue, in that city.

The city of Akron, O., has authorized a bond issue of $166,500 for the purchase of a site and the erection of a school building.

D. T. Riffle, Keenan Building, Pittsburgh, has been awarded the contract for the erection of a Y. M. C. A. building at Uniontown, Pa., at a cost of $117,543.

J. A. Burner, McKnight Building, Minneapolis, has prepared plans for a $100.000 courthouse for Lincoln County, at Ivanhoe, Minn.

Hamden Plains Methodist Episcopal congregation, of New Haven, Conn., will erect a new church on Dixwell Avenue and Church Street, after plans by R. W. Foote, New Haven.

The Citizens' Trust Company, of Schenectady, N. Y., will erect a $75,000 three-story banking building.

The Central Trust Company, of Norwalk, Conn., will erect a one-story banking building, after plans by G. F. Shepard, 14 Kilby Street, Boston.

Kent County, Mich., is planning the erection of a $100.000 juvenile home at Grand Rapids.

Carrere & Hastings, New York, are preparing plans for a $1,600.000 hotel on Sixteenth Street and New Hampshire Avenue, Washington.

The First National Bank of Florence, Ala., has let the contract for the erection of a new brick and marble banking building, to cost about $65,000, to L. E. Tate, of that city.

Bates & Gamble, Toledo, are preparing plans for a $100,000 high school of stone and brick, at Maumee, Ohio.

The Y. M. C. A. of Butte, Mont., is planning the erection of a $100,000 building.

St Stephen's Hungarian Congregation, of Bridgeport, Conn., will build a granite and brick church, to cost about $125,000, after plans by B. Wozny, Main Street, Springfield, Mass.

Pratt, Kan., will erect a three-story stone and brick high school, to cost about $150.000. The plans are by W. E. Hulse & Co., Hutchinson, Kan.

St. Paul Congregation, of Waterbury, Conn., are planning the erection of a $85,000 stone church.

The International Association of Machinists is planning the erection of a five-story building, to cost about $125,000, on Ninth Street and Mt. Vernon Place, N. W., Washington.

A. Kahn, Detroit, is preparing plans for a hospital for the University of Michigan, at Ann Arbor, to cost about $1,000,000.

The First Baptist Congregation of Richmond, Va., will build a new stone church.

W. T. Towner, New York, is preparing plans for a high school, of brick and limestone, to cost about $90,000, at Port Jervis, N. Y.

St. John's Episcopal Congregation, of Lakewood, Ohio, is planning the erection of a stone and brick church, to cost about $100,000.

Shipments of Marble for Statuary

The War Trade Board announces that the list of commodities which will be considered for exportation to European Holland and Denmark proper has been revised. Applications for licenses to export alabaster and marble for statuary will now be given consideration. Licenses will be valid only for shipment on vessels flying the flag of the country to which commodities are destined. All shipments to European Holland, except those consigned to the Government of the Netherlands, must be consigned directly

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An example of early English stonework from a drawing by T. Arthur Richardson, in the London *Architect*

to and only to the Netherlands Overseas Trust Company. Shipments to Denmark may be consigned to individuals if the prospective importer has first obtained an import certificate from the Merchants' Guild of Copenhagen or the Danish Chamber of Manufacturers.

Government Work

The contract for the erection of the new post office at Indian Head, Md., has been awarded to the Austin Company, 1313 H Street, N. W., Washington.

Contracts for the building of piers and breakwater at the Submarine Base, Hampton Roads, Va., have been awarded to J. Stewart, 30 Church Street, New York, at $710,000, and H. P. Converse, Norfolk, Va., at $600,900.

The contract for camp construction at Fayetteville, N. C., has been awarded to J. Stewart & Sons., 30 Church Street, New York. The amount involved is about $4,000,000.

Business Embarrassments

John P. Lloyd, of Matawan, N. J., has been appointed temporary receiver for the Architectural Tile Company, of Keyport, N. J.

Oliver K. Day, as receiver for the Whippany, N. J., Sand Company, has sold a tract of land in Morristown, containing nearly nine acres, to A. S. Robinson.

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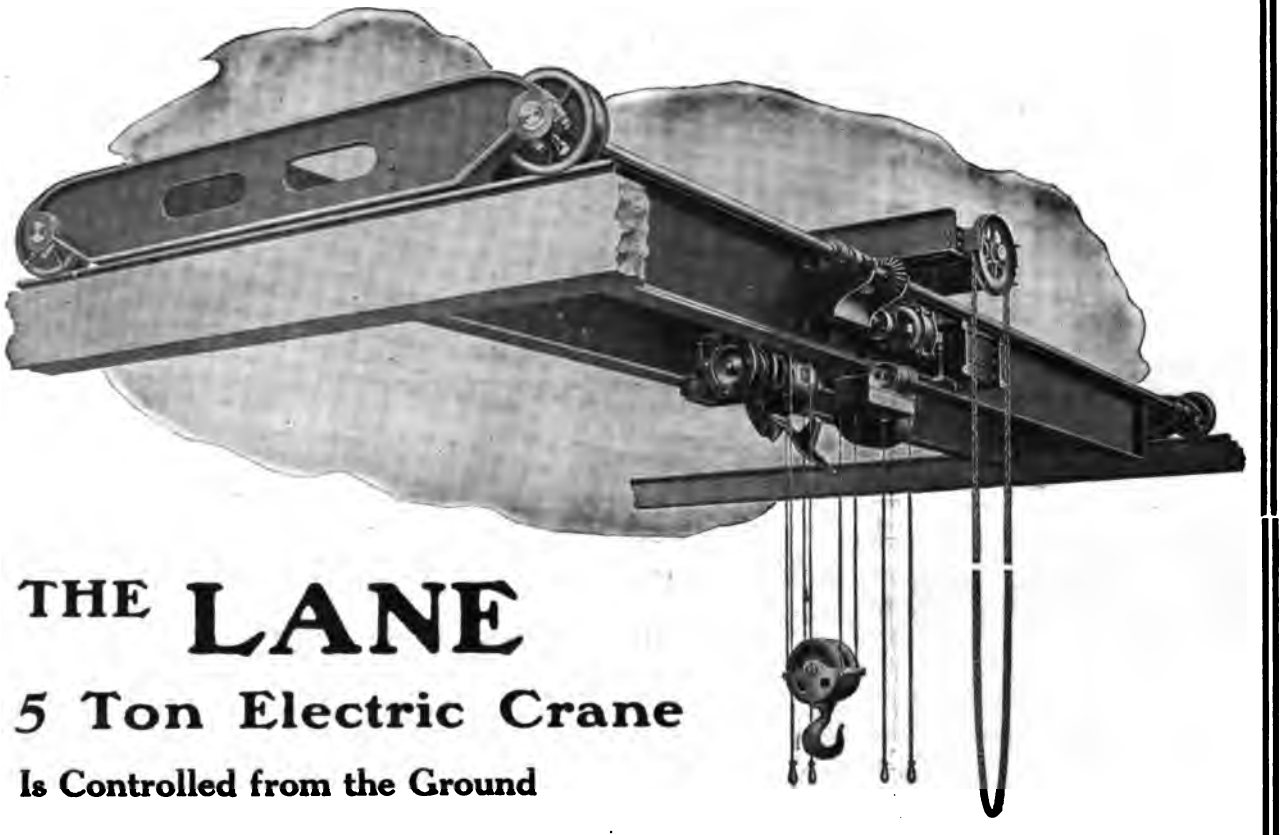

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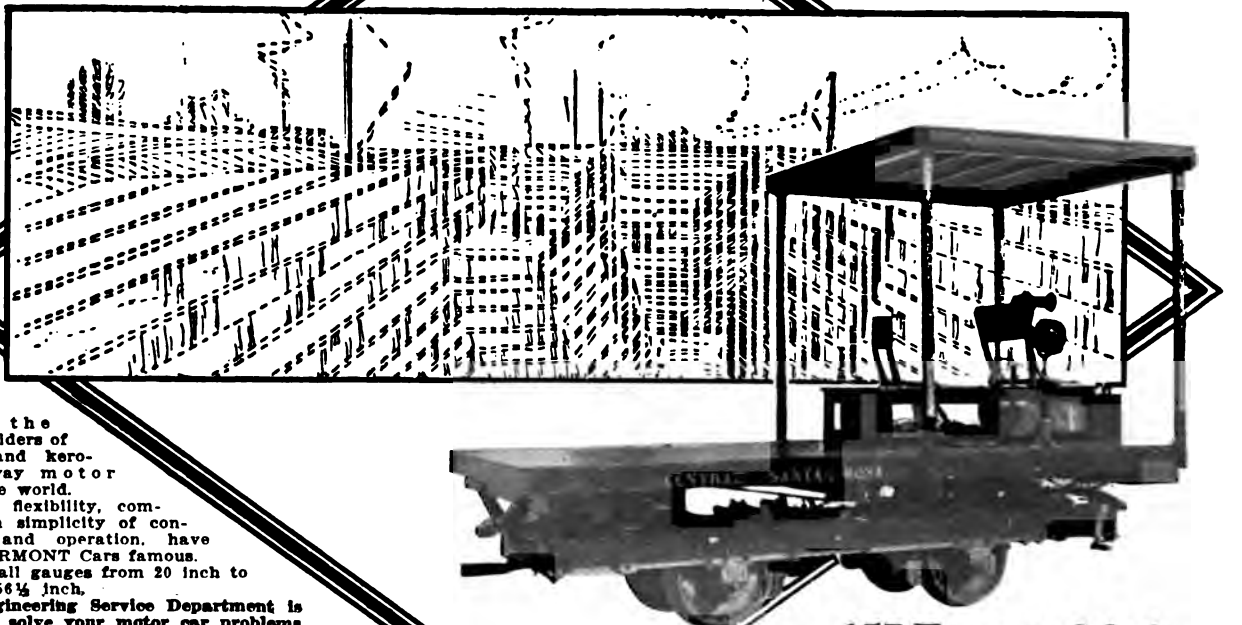

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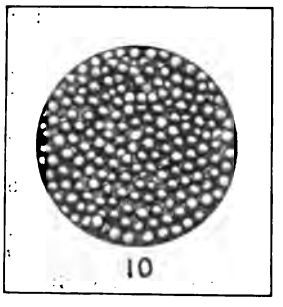

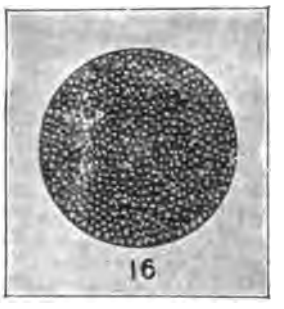

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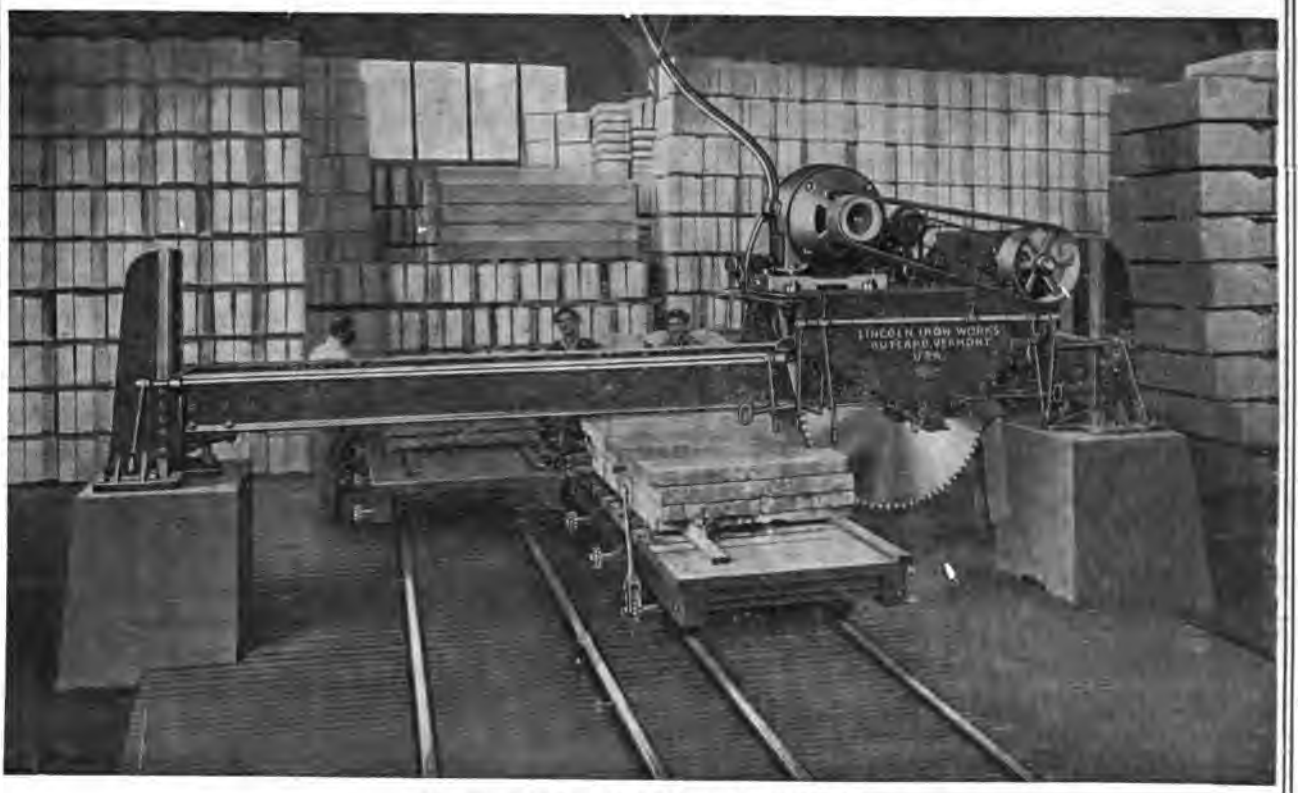

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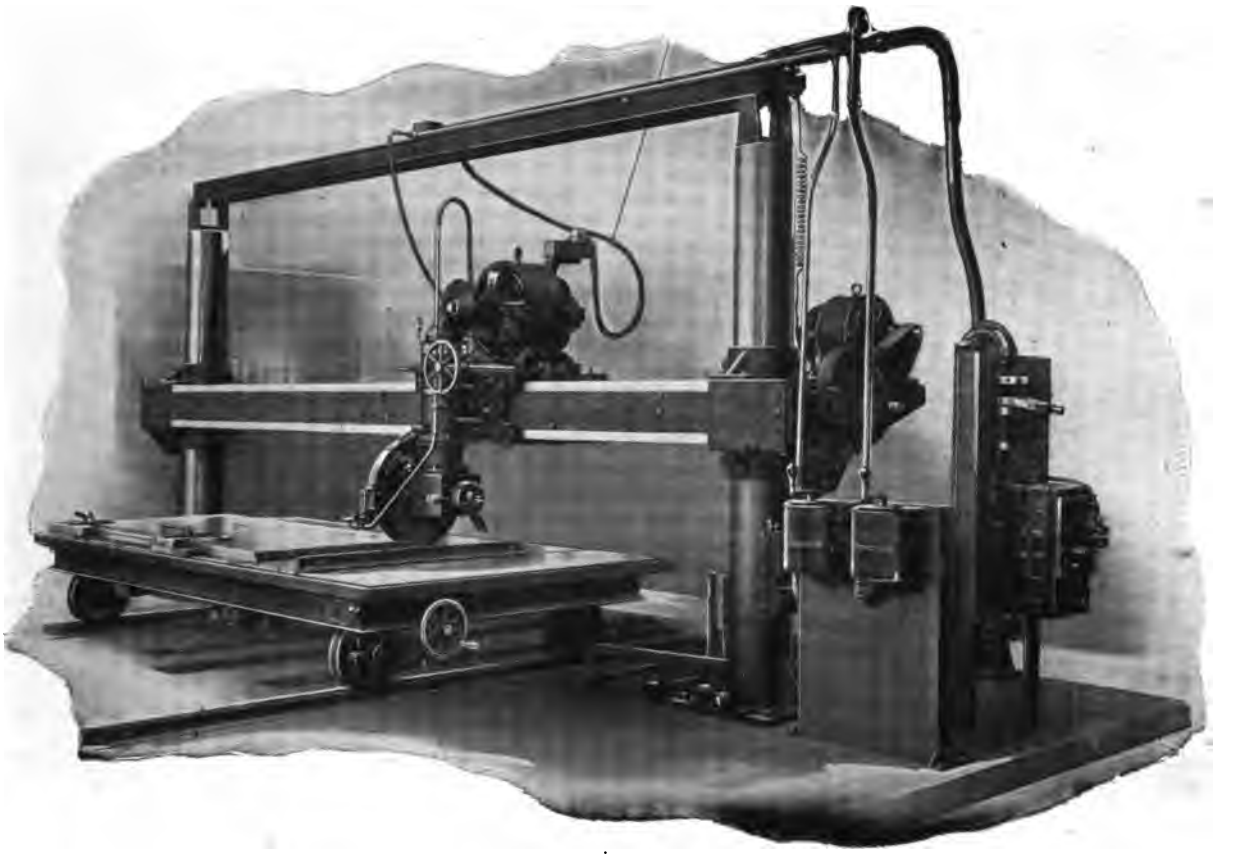

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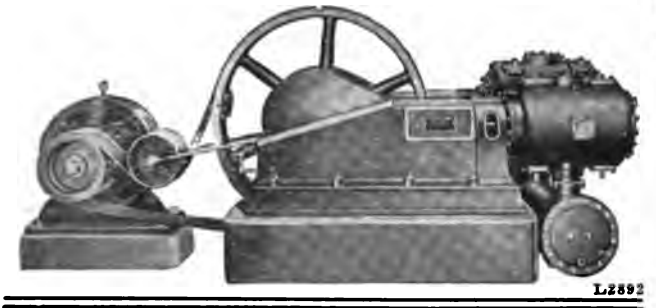

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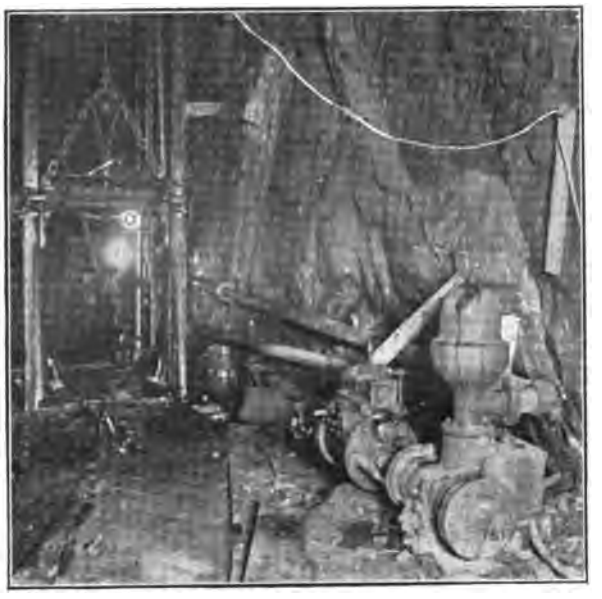

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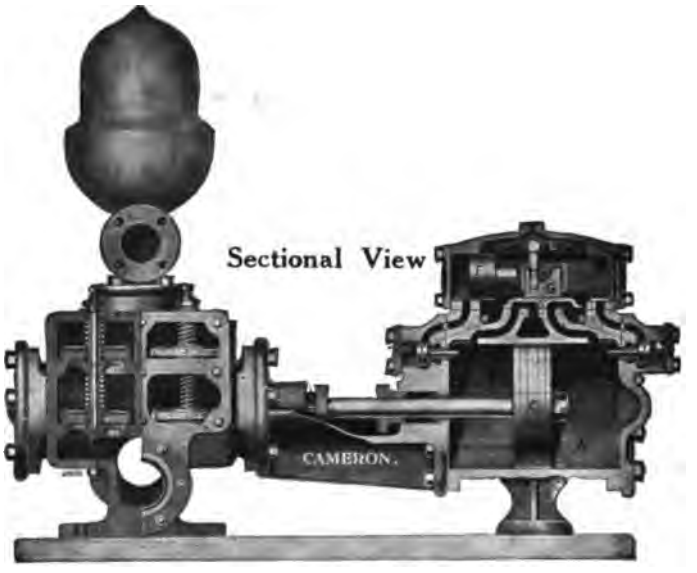

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CONTENTS

	PAGE
KEEPING THE BUILDING INDUSTRIES ALIVE	457
KINGS COUNTY COURTHOUSE, *illustrated*	459
AUSTRALIAN STONE USED IN LONDON	460
THE GRANITE TRADE ABROAD	460
CRUSHED STONE PLANTS MAY CLOSE	461
THE COLORADO-YULE PROPERTY	462
THE USES OF SILICA	462
SHAFT IN HONOR OF UNIVERSITY MEN	462
AMERICAN USE OF BIG STONES, *illustrated*	463
SOURCES OF POTASH IN AMERICA	463
SAND AND SANDSTONES, *illustrated*	464
STONEWORK IN THE FRENCH CATHEDRALS	466
DOMESTIC SOURCES OF PUMICE STONE	467
EDITORIALS:	
The Fourth Liberty Loan	468
Lessons of the War	469
Speaking of Peace	470
GOVERNMENT MAY HALT WORK	470
A CIRCLE-ON-CIRCLE ARCH, *illustrated*	471
EMPLOYMENT IN THE STONE TRADE	471
MARBLE AND GRANITE	472
LIMESTONE TURNED TO PHOSPHATE ROCK	472
LIMESTONE AND SANDSTONE	472
CONSTRUCTION NOTES	473
GOVERNMENT MUST APPROVE HIGHWAY WORK	474
ILLUSTRATIONS:	
Corridor in American Marble.	
Tower at Nevers, France.	
Gazebo at Ashby-de-la-Zouch, England.	

ALPHABETICAL LIST OF ADVERTISERS

	PAGE
Alabama Marble Co	451
Appalachian Marble Co	448
Ardolino Brothers	478
Bacon, Earl C	—
Barr, Thaw & Fraser Co	478
Bedford Steam Stone Works	478
Blum & Delbridge	478
Bowman & King Stone Co	478
Brodix & Malone	452
Brown, George & Co	455
Buckeye Gray Sandstone	—
Building Stone & Clay Products	478
Cameron, A. S., Steam Pump Wks.	487
Carthage Marble & White Lime Co.	478
Chicago & Bloomington Stone Co.	478
Clark-Conroy & Co	478
Cleveland Stone Co.	—
Consolidated Stone Co., The	445
Continental Car Co. of America	477
Craig Co., John J	448
Dallet Co., Thos. H	485
Dark Hollow Gray Limestone	—
Empire Stone Co	478
Farrell Foundry & Machine Co	477
Fairmont Gas Engine & Railway Motor Car Co	483
Falt & Co., J. P	446
Frenier & Son	477
Furst-Kerber Cut Stone Co	447
Georgia Marble Co., The	449
Gray "Canyon" Sandstone	453
Gray Eagle Marble Co	448
Gillies & Sons, James	478
Hanlein & Son, Henry	446
Harrison Supply Co	481
Heinlein Cut Stone Co., John	478
Hoosier Cut Stone Co	446
Indiana Limestone Quarrymen's Association	442-443
Indiana Quarries Co., Inside back cover	
Ingersoll-Rand Co.	481
Laidlaw Dunn Gordon Plant	—
Lane Manufacturing Co	479
Lidgerwood Manufacturing Co	485
Lincoln Iron Works	480
Manning, Maxwell & Moore, Inc.	—
Marble & Marble Workers	448
Marine, Arlando	478
McDermott Stone Co	452
McLaren & Sons, James	444
McMillan & Son, W	446
Mt. Airy Granite	455
Meyers Machine Co., Inc., Willard F.	482
Miller Co., David	478
Monahan Stone Company	478
Napoleon Gray Marble Co	—
New Albany Machine Mfg. Co	477
North Carolina Granite Corporation	455
Ohio Quarries Co	454
Patch, F. R., Mfg. Co., Inside back cover	
Payne & Co., N. B	477
Phenix Marble Co	456
Pollard Mfg. Co., Ltd	476
Quincy Column Turning Co	452
Riverside Machinery Depot	488
Rockport Granite Co	452
Roebling's Sons, John A	483
Ross & Republic Marble Co	448
Royal Marble Co	448
"Silk of the Trade"	455
Shaw Electric Crane Co	—
Shea Donnelly Company	447
South Dover Marble Co.	Back cover
Spurr & Son, J. J	444
Star Stone Co	444
Steam Stone Cutter Co	—
Struble Cut Stone Co., Henry	478
Sullivan Machinery Co	477
Sutermeister Stone Co., A	478
Tompkins Kiel Marble Co.	450, 451, 484
Tom-Kiel Cement	—
Trow & Holden	484
Victoria Marble Co	448
Waterbury Company	475
Winnesboro Granite Corp	—
Worthington Pump & Mach'y Co	485

BUYERS' DIRECTORY OF THE STONE TRADES, PAGE 486

CLASSIFIED ADVERTISEMENTS, PAGE 488

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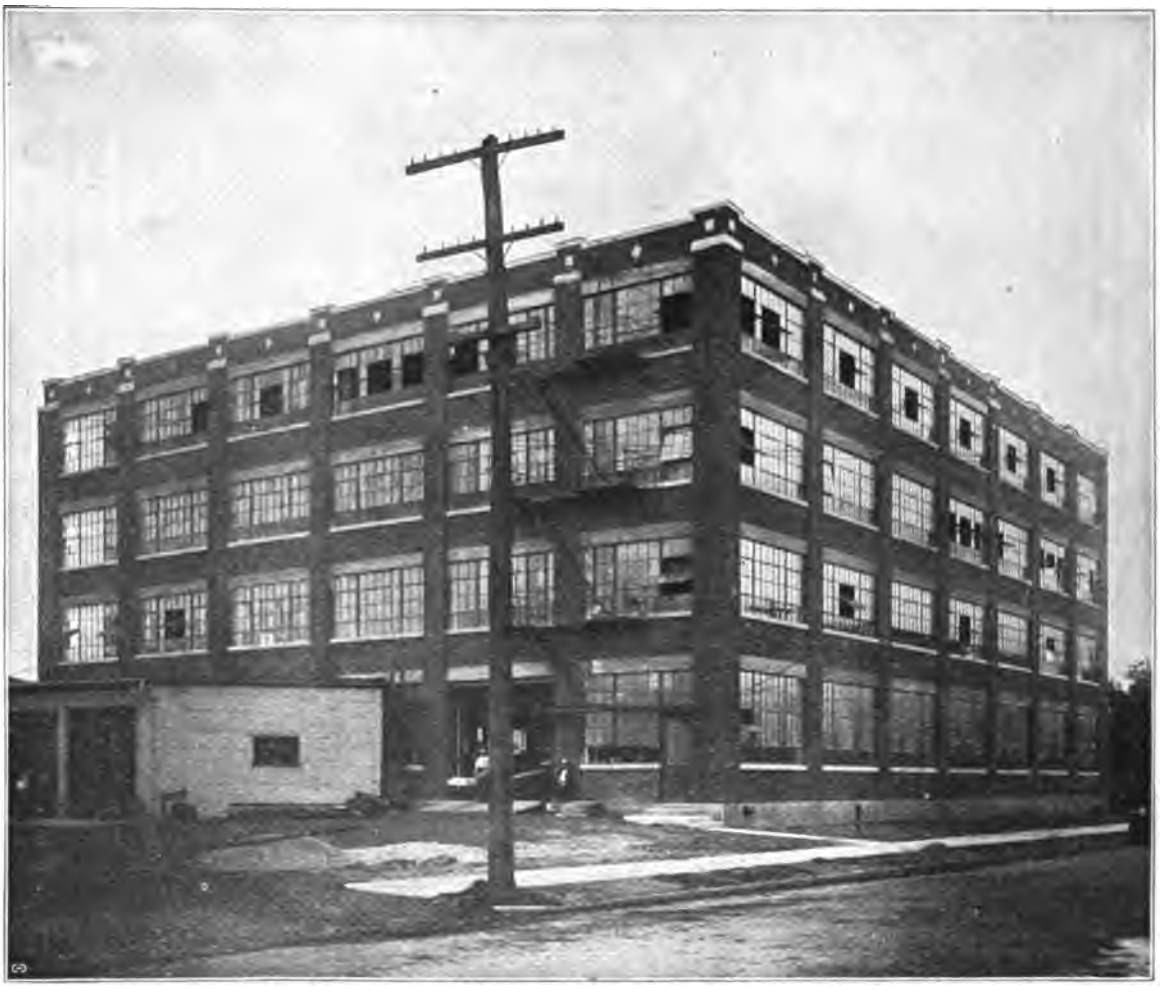

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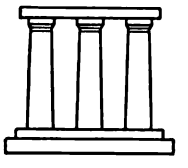

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STONE

VOLUME XXXIX OCTOBER, 1918 NUMBER 10

Keeping the Building Industries Alive

IN order to meet war conditions and to co-operate to the fullest with the Government, while at the same time conserving its own interests, the National Federation of Building Industries was recently formed and held an important convention in Atlantic City. As a result of this organization the Executive Board has issued a statement to representatives of the United States Administrative Boards. This is an admirable summary of the importance and the claims to consideration of the building and related industries, and the methods by which it can and will co-operate with the Government during the present industrial crisis. The statement opens with a declaration of the close relations between building proper and its many branches, which are generally regarded as independent industries in themselves. Then it declares: "Engaged in design and superintendence there are in the neighborhood of three thousand architects, and a greater number of engineers. There are approximately two hundred organized local builders' exchanges composed of contractors and material dealers, and there are in the neighborhood of two hundred and fifty associations of manufacturers of lumber, cement, heating apparatus, paint, asbestos, glass and the like. These must all work together for speedy and economical construction, timing as the players in an orchestra or the gears in a machine. The capital invested in the industry is conservatively estimated to be over $2,000,000,000, while its annual product in normal times is estimated with equal conservatism at upwards of $3,000,000,000, and it gives employment in normal times to a million and a half men skilled and unskilled."

"If the Government intends to be understood as discouraging any civil construction whatever, it can only be due to an official supposition that there is no civil construction which does not interfere with its war program," the statement goes on to say. "Is such a supposition warranted by the facts? It might be true in some sections, but not in others. It might be true at one time and not at another. It is doubtful whether the readjustment of the building industry to the handling of war work would ever—even if the war was continued for several years—result in the complete absorption of all surplus materials suitable for construction needs of the civil population throughout the United States. It is a fact that general conditions, due to the war, both before and since our participation in it, have already curtailed building operations to the irreducible minimum. Further curtailment must imperil the life of the industry.

"There is no question but that steel and some other materials will not be available for building purposes until the war is over. Construction involving steel has been abandoned. This fact is everywhere recognized, and projectors and contractors have stricken steel construction from their program. The Government has no need to discourage this class of civil construction, as filling its own requirements has automatically shut off the supply. In like manner, financial, transportation and labor conditions have further shut off the supply. However, while these materials will not be available, in all probability, until peace returns, other materials exist in surplus. Lumber, for instance, on being cut into ship lengths, leaves an enormous by-product of lengths suitable for building.

"As to fuel, many manufacturing plants use water power, and others use refuse for fuel. In others, adjustments by zoning and consolidating can be effected which will save both fuel and transportation. Substitutes can be devised for materials which have been used in the past, and new sources of material drawn upon which will not only save fuel and transportation, but also increase fuel supply."

It is then pointed out that while the war industries are short of labor, reports from the Department of Labor indicate that there has been a continued surplus of skilled artisans in the building line throughout the country, except in certain congested districts—notably in the Atlantic Coast States and certain points on the Pacific Coast. The following important point is emphasized: "The skilled working force of an industry, as we have recently found in shipbuilding and airplane building, is indeed a 'national resource,' most ill-ad-

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visedly distributed and rendered inefficient through changes and malassimilation."

It is pointed out that "transportation is a simpler problem in building than in many other lines in one respect—the average haul is short. This is the natural result of the great weight of its goods—the cost of a long haul is prohibitive. Every center of population draws its construction materials from the region round about. One survey made by a committee of the Chamber of Commerce of St. Louis developed the fact that 75 per cent of such materials were drawn from a radius of twenty miles. Neither does the transporting of building materials increase the great strain on transportation facilities at the terminals, where cars must wait their turn to unload. For the most part building materials never approach terminals or chief junctions, and often such materials can be carried in cars which are returning from a loaded trip, and which would be empty homeward bound except for picking up such cargoes.

"The investment aspect of this question has called forth the confusion of thought which usually attends the discussion of money and credits. Construction is affirmatively beneficial in time of war as in peace—but in war time there is the negative side that it must not obstruct the winning of the war, although the positive advantage still subsists with the added necessity of keeping ready for peace a vital national facility. A nation at war must not go into economic decadence.

"During the time when the production of the nation is being burned up, thrown into scrap heaps, or consumed as food, it may not be amiss to make provision for the morrow whenever this can be done without interference with the war program. Building does not lock up funds, but transfers them from one hand to another. Material from the raw is raised in the form of structure which can be taxed and on which money can be borrowed. It earns its own upkeep and replacement beside the return which the capital would be earning if it were being 'saved.' Rent is the first cost of all necessities and civil construction must continue if we would mitigate the increased cost of living. We need not dwell upon the financial phase of the stoppage of plant in which $2,000,000,000 is now invested.

"When building stops in any community, that community begins to run down at the heel in its housing for residents and business. In war as in peace, depreciation is constant—there is the real estate scrap heap and there is the fire loss. Even stationary population must have new dwellings and other common types of structures or the community will suffer in health and morals from overcrowding, defective sanitation and a general delapidation at home and at work. It is already apparent that the need, especially for dwellings, has in many parts of the country seriously overrun the supply.

"Not the least important reason for sanctioning civil construction, when, where and as war needs permit, is that national interest requires the preservation of the industry as a national facility. The merchant marine was allowed to disintegrate, and we encountered the necessity of creating and manning a fleet under pressure and at the highest cost, and taxing the money out of the income of the people. The efficiency of the railroads likewise declined with a somewhat similar result. The people paid. War needs come first, but we should do what we can to prevent the breaking down of an entire industry, and the disintegration of its now efficient plants and of its forces of skilled artisans which must be constantly available, not only to give our people necessary living facilities, but to be always in readiness for war work and for the reconstruction period to follow the war."

After having stated its views as set forth in the above summary, the Executive Board of the Federation suggests to the United States Government Administrative Boards "certain specific things which we feel might be helpful in establishing a contact point:

"First. We suggest that the Government, through its existing agencies, might avail itself of the knowledge, experience and ability of the men in the building industries to advise with the proper Government agency in each region on all requests for building permits. This Federation will be very glad to appoint small committees of the most reputable and capable men in the industry to co-operate with the Government in an advisory capacity in each region.

"If this suggestion meets with approval and is acted upon, it would be our idea that the committees so appointed should be purely advisory, and that they should be wholly responsible to the governmental agency with which they might be co-operating.

"Such committees would be selected with a view to securing the services of men who would give the time and attention necessary for the work. They would have to be prepared to investigate personally the labor, materials, power and transportation situation in each city, town or village in their region if necessary, with the idea of giving your agency an accurate and intelligent first-hand report of the conditions existing at the time when any new piece of work is projected, which information would be based upon practical knowledge.

"Second. We suggest that the War Industries Board, the Railway Administration, Fuel Administration, Capital Issues Committee and other governmental agencies which may have occasion from time to time to issue rulings and regulations which bear directly upon the building industry, call our committee into conference before such rules and regulations are adopted and promulgated. Such a conference would enable us to give you the benefit of the knowledge, experience and thought of the building industry, as a single entity, applied to each specific problem, and at the same time enable our committee by such personal contact to understand the Government's point of view

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and the necessities of each case, thereby enabling us to make intelligent and satisfactory explanations to the whole industry. The importance of this point both to the Government and to the industry cannot be too strongly emphasized."

Potash from Granite

Experiments are being conducted in Aberdeenshire with a view to the extraction of potash from granite. Potash is found in felspar, which is one of the constituents of granite. The proportion varies, some granites being richer than others. Under the auspices of the Geological Survey, rock from different parts of the country is being tested, with a view to seeing whether the yield of potash will warrant the setting up of works.

Kings County Courthouse

The Kings County Courthouse has just been completely renovated and in part rebuilt. The work has been in hand for a long time, but has been delayed by litigation, the scarcity of materials and labor, and various other causes. The advent of the new court house will be welcomed by the Justices of the Supreme Court and the attaches who have suffered many inconveniences due to small quarters and congested conditions. Several times during the summer months sessions had to be adjourned, due to the intensity of the heat and the poor ventilating conditions. At last after a strenuous and lengthy struggle against what was christened the "patchwork" plan, including many court proceedings and adverse opinions on the part of more than one hundred civic and industrial organizations, Brooklyn has succeeded in retaining its old court house, but with numerous additional changes that make a marked improvement in the structure.

The building shows no trace of what might be termed "patchwork" and now has a cubical content of 2,750,000 cubic feet, equal to that of a twenty-story office building 100 feet square. The new court house building is 340 feet long and 124 feet wide and four stories in height. The former roof has been removed and a new story has been built over the entire area of the building with the exception of the place occupied by the rotunda and dome, which have not been changed. The old façade on Livingston Street, which was marble, brick and galvanized iron, has been removed and rebuilt in granite and Indiana limestone. The façade on Joralemon Street has been thoroughly renovated and repaired, but no structural changes have been made.

The interior has also been rearranged and renovated. The corridors have marble tile floors and marble wainscoating and pilasters. The old circular stairs have been removed and a new marble stairs built. The work of renovating and remodeling the old court house began

KINGS COUNTY COURT HOUSE, BROOKLYN
The rebuilt façade on Livingston Street. Architect, F. H. Quinby. General Contractor: P. J. Carlin Construction Company. Cut Stone Contractor: Andrew D. Baird & Son. Built of Indiana Limestone from the Consolidated Stone Company, Bedford

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immediately upon the award of the contract and progressed very rapidly, for on October 27, 1917, the then Borough President, Lewis H. Pounds, announced that the work was nearing completion and that the court house would be ready by March 1 of this year, but due to war conditions, shortage of materials and scarcity of skilled labor, the work was unfortunately delayed.

The work has all been done from the designs of Architect Frank H. Quinby, and the general contractors were the P. J. Carlin Construction Company, both of this city. The cut stone work was done by Andrew D. Baird & Sons, Brooklyn. The original building was completed in 1865, and about 1890 a large addition was erected.

Australian Stone Used in London

Australia House, the headquarters of the Commonwealth of Australia in London, was recently opened by King George. Built on a fine site, the structure is evidence of the wish of Australia to be represented at the centre of the British Empire in a building of dignity and beauty. The entrance is flanked by two groups of statuary. That on the right, showing a dying explorer and his companion, represents the awakening of Australia; on the left is a group symbolical of the youthful industries of the Commonwealth and its prosperity. Australia House, a building of ten floors, is described by the architects (Messrs. A. Marshall Mackenzie & Son) as based on the strong columns of Roman architecture, with some qualities of the French eighteenth-century style. The main entrance hall is a notable feature, with its marble walls and decorations, and there is an uninterrupted view of 200 feet through the entrance hall, vestibule, and exhibition hall. Throughout the interior Australian wood, marble and stone have been plentifully used, and the internal decorations are in keeping with the rest of the building. The construction of Australia House was begun in 1911, and the foundation stone was laid on July 24, 1913. The site cost about $1,900,000, and the total cost when the building is complete will be not far short of $5,000,000.

The Granite Trade Abroad

IT is only to be expected that the stone industry in the European countries should be almost completely suspended during the progress of the war. Some of the great producing centers are actually within the field of operations. Belgium had some of the largest and best equipped quarries in the world. That country had specialized in stone-working machinery, and especially in the application of electricity to the quarrying and working of stone. It is reasonably certain that Germany has requisitioned the greater part of this equipment. The news reports have made constant reference to the use of quarries in various portions of invaded France as shelters for troops, and these have proved the most difficult positions to capture. Behind the lines American engineers have equipped some of the French quarries with American machinery and are operating them to furnish stone for road building and war purposes. The great marble quarrying district of Carrara, Massa and Pietrasanta is far from the battle-front, but work languishes there because of the lack of labor and the difficulties of transportation. Aberdeen occupies much the same place in the granite industry that Carrara holds in the marble field. It feels the effect of the war in the same way, with the added disadvantage that the trade has been depressed for some years. A correspondent of *The Quarry* gives a gloomy picture of the condition of affairs in the Scotch granite city. The writer says:

Not for many years has the granite quarry industry of Aberdeen been in so unsatisfactory a condition as it is at present, with no hope of any improvement in the near future. In fact, it is getting worse as time rolls on, both in regard to the output and the demand for certain classes of stones. Before the war broke out it formed one of the important industries in this district, and it had just begun to emerge from a somewhat quiet period, and hopes were entertained that a time of considerable activity was near at hand. Those hopes, however, were doomed to disappointment by the unfortunate events following the declaration of war, and since then it has gradually gone down until it is only the shadow of its former self. Among the industries that have suffered during the past three years, few, if any, have been more severely hit than the granite quarrying trade, because its production was not directly or indirectly required for military purposes. As a natural consequence of the dullness in the building trade and the reduced number of paving contracts, the demand for stones for these purposes has greatly fallen off. The increased value of all materials required, and the costly plant that has to be kept up to efficiently work the quarries in this neighborhood, form a great increase to the cost of production, especially when the plant is not fully employed, which it cannot be at present, owing to the big reduction in the number of workmen. Machinery, of course, is a great advantage when it can be fully utilized, but when it is standing idle part of the time it means an increased expense to the owners. To keep up the same amount of power for half the output is a great handicap on the industry, without any corresponding advantage. Even if there was a good demand for all kinds of stone, which there is not at present, the shortage of labor would prevent the quarries from being fully operated. It is satisfactory, however, to

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note that there is a good demand for the best quality of granite blocks for monumental purposes, but, unfortunately, these cannot be obtained without quarrying a large portion of the less valuable material, for which there is not so much demand.

Foreign competition formed a very formidable rival to the home producer before the war began in the supply of the raw material for monumental purposes and paving setts, but for the present the competition in this line is practically at an end, especially in regard to monumental stones. There is, however, some foreign granite in Aberdeen yet, as some of the granite manufacturers have small quantities of it still on hand. but it is daily wearing away, as they are receiving no fresh supplies. It is now about two years since any foreign granite was imported at Aberdeen, and although the quantity required to keep the trade going is small compared with what it was in normal times, it is gradually being used up. It is to be feared that most of it will have disappeared before any more can be got, and the trade will have to depend largely on the home product for some time. At the annual meeting of the Aberdeen Granite Association, which was held on June 7, the president, Mr. James Stewart, referred to the great difficulty that was being experienced by the trade owing to the scarcity of material and the depletion of labor. He also dealt with the prospects of the trade after the war and the policy that ought to be pursued by the association to advance the interests of the members in the years to come.

The export trade of granite to the United States of America, although not altogether stopped, has greatly fallen off since the war began. During the past six months the value of granite dispatched to the United States was only $265. There were no granite monuments sent to the United States for the months of February, March, April and May. It will therefore be seen that a great change has come over both our import and export trade in granite. In 1891 the value of granite exported from Aberdeen to the United States was $356,800, which was, of course, one of the best years; but it will give some idea of the extent of the trade then and the great reduction that has taken place. In 1913 the value had dropped to $93,185, but showed signs of revival the following year and rose to $147,630. Since then, however, the export of granite has decreased until it has nearly disappeared altogether, which will be seen by the figures I have given. This is a branch of trade, however, that has varied considerably in normal times, and while it seems to have practically vanished for the time being, it will likely return after the war is over.

As a consequence of the great depression that prevails in the building trade, both in the city and the country districts, orders for building stones are comparatively few. Although the output from the quarries has been reduced to a minimum by the shortage of labor, the reduced supply has probably been quite enough to meet the requirements of the trade, and in some cases a part of the product may be going into stock. There are no large public buildings being erected in Aberdeen just now, and very few dwelling houses. It is not because there is no demand for houses that so few of them have been erected recently, but it is owing to the fact that it will not pay at the present time to build, and very few people are inclined to put their money into house property. Until the restrictions are removed and property owners are allowed to raise the rents, so as to give a fair return for the money invested, it is to be feared that there will be no improvement in this branch of trade.

Crushed Stone Plants May Close

"There is a probability that some stone plants will be requested to cease operation. The Priorities Board may have to decide which plants are essential. Plants without contract, directly or indirectly connected with war work, may be classed as non-essential," said A. P. Sandles, secretary of the National Crushed Stone Association, to a reporter at Columbus, O., upon his return from Washington, where he had been in conference with government officials and members of the association from all parts of the country. "The new war draft law, extending age limit 18 to 45, and an army of 4,000,000 men in France, will further drain the labor reservoir and intensify the need of pooling production. The Government is now recognizing the need of regulating distribution of labor and the wages of labor. The Government believes that if able-bodied boys who enter military service and serve as gun targets away from home at $30 and $40 per month, that those who remain at home should not expect to make four to eight times as many dollars per month. The War Service Committee, organized under R. L. Humphrey, chief of Building Materials Section, War Indus-

CORRIDOR IN AMERICAN MARBLE

Michigan State Telephone Building, Detroit, finished in Moretti-Harrah Madri Cream Marble from the Tompkins-Kiel Company. Architects: Smith, Hinchman & Gryllis, Detroit.

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tries Board, is to be known as the 'Committee on Mineral Aggregates,' and will have no jurisdiction over production of stone for fluxing, sugar making, air nitrate plants, soda ash for agricultural uses. This committee on mineral aggregates will have to do with crushed stone, sand, gravel and slag used in concrete work, road work and ballast."

The Colorado-Yule Property

The entire plant of the Colorado-Yule Company, including marble quarries worth millions, thirteen miles of railroad and enormous plants for quarrying and shaping the stone, may be sold for $8,000, says the Denver *Post*.

For years the company failed to pay its taxes to Gunnison County. Back taxes aggregating $75,000 accumulated. The company was without funds at times and at other times was fighting the county on the tax amount. When the court held for the county the company was in the hands of a receiver and wholly without funds. Efforts at a compromise at one time would have permitted a settlement for $35,000, but the receiver could not raise the money. The matter went on and on until the county commissioners agreed to sell their claim to M. S. Radetsky, the Denver junk dealer, for $8,000. The offer was accepted and Radetsky stood to receive his tax deed when Judge John I. Mullins, in whose hands the possession rests, issued an injunction to prevent the deal being closed.

Radetsky, under the tax deed, would become, if not the ultimate owner of more than $2,000,000 worth of property, at least the claimant to it under the tax title and be in position to demand probably $150,000 for its redemption.

Judge Mullins has taken up the matter in the hope of saving the property until after the war. The Government has declared this a non-essential industry and refused to come to the relief of the company. To-day there is no demand for the product. The federal building in Denver was built of marble quarried and shaped at the plant; federal buildings elsewhere in the country have been built under its contracts; it is recognized as one of the great marble beds of the country, but until the country wins the war and has time for building, the property will be of little immediate value. Bondholders are now willing to pay Gunnison County $37,000 for its claim, but the county has made its deal with Radetsky, and so the situation stands unless the court can make some new alignment.

The Uses of Silica

The silica industry in the United States has reached considerable proportions, the production in 1917 having reached a total value of $1,636,995, as reported by the Government. This is an increase of 187 per cent in quantity and 68 per cent in value, as compared with 1916. Silica (quartz) is used for many purposes, principally in the manufacture of pottery, paints and scouring soaps, as a wood filler, as a polisher, and in metallurgical and chemical processes. In the pottery industry, where it is generally called flint, silica is used in the body of the ware to diminish shrinkage, and is also used in glazes. Silica for use in pottery should contain less than 0.5 per cent of iron-bearing minerals. Manufacturers of paint use considerable quantities of very finely ground silica, which forms as much as one-third of the total pigment in some paints. For this purpose finely ground crystalline material is superior to fine sand in its natural state because of the angularity of the grains, which makes them adhere more firmly to the article painted and after wear affords a good surface for repainting. The same angularity makes artificially comminuted crystalline quartz superior to natural sand for use in wood fillers. For soaps and polishing powders ground material is preferred to natural sand on account of its whiteness and angularity. For all these purposes large quantities of pure quartzsand and sandstone are finely ground and yield a product fully equal to that obtained by grinding massive crystalline quartz.

Quartz crushed and graded to various sizes is used in making sandpaper and sand belts, as a scouring agent, for "frosting" glass with sand-blast apparatus, and for other purposes. Blocks of massive quartz and quartzite are used in the chemical industry as a filler for acid towers and as a flux in copper smelting. Ground quartz is also used in filters and in tooth powders and by dentists as a detergent.

The material known commercially in the United States as tripoli, which is the siliceous residue of decomposed limestones, also yields an excellent grade of pulverized silica, which is used for the same purpose as silica powder obtained from massive crystalline quartz and from sands and sandstones. Diatomaceous (infusorial) earth is also used to make polishing powder that is employed for similar uses to those for which quartz, sand and tripoli powders are employed, but diatomaceous earth has somewhat different properties and most of it finds different application, as insulating and filter material.

Shaft in Honor of University Men

The names of 7,000 University of Pennsylvania students and alumni who are fighting in France will be inscribed on a memorial stone, the concrete foundation for which is now being laid on the campus, opposite the entrance to the library. The platform measures 10 by 30 feet and the structure to be erected upon it will be 8 feet high. In the stone, in separate sections, will be hewn the names of the men who enlisted, those who fell for their country, those who were reported wounded and missing, and the heroes who have been decorated or cited for valor. The structure will be unveiled next fall.

The monument will be built by the University in re-

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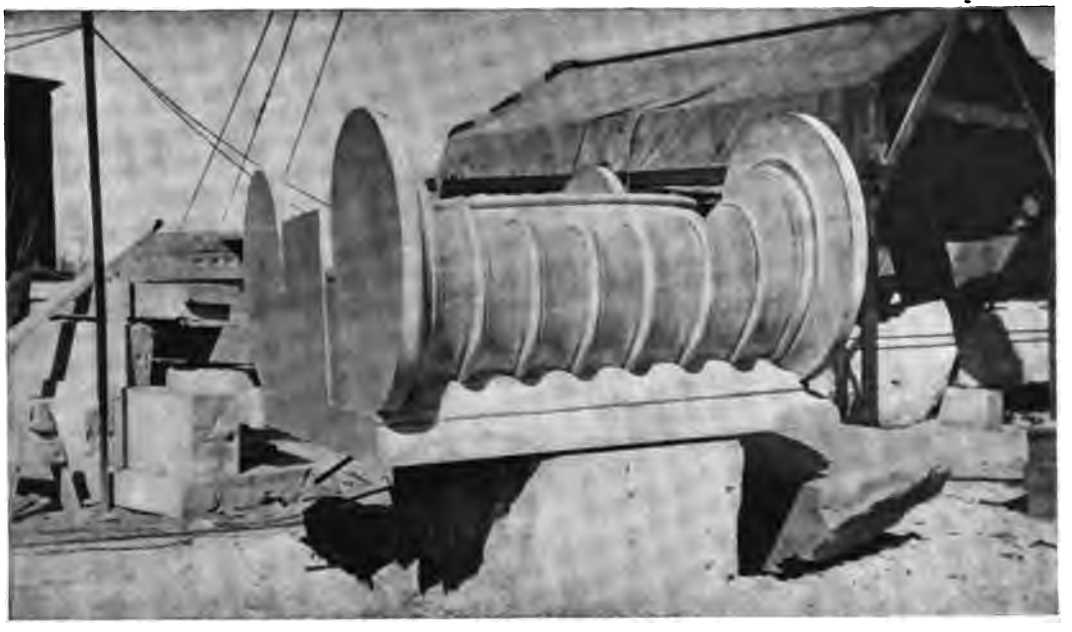
sponse to a suggestion of the department of military service of the Pennsylvania Council of National Defense, Thomas De Witt Cuyler, chairman, which, acting upon the recommendation of the military morale section of the office of the chief of staff, has invited all communities in this state to erect permanent honor rolls for their men in the service. The University is the first institution in Philadelphia to respond. The city itself has been approached, but thus far has not acted.

American Use of Big Stones

American quarries and stone contractors excel all others in furnishing and working large stones for architectural uses. Our quarries are equipped with every appliance for getting out stone, while European quarries still depend very largely upon drills and plugs and feathers. Then, too, they have derricks and hoisting apparatus capable of handling masses weighing many tons. In the same way our cutting plants use machinery wherever it is possible, and we have originated dozens of appliances that greatly facilitate and cheapen the working of stone. It is needless to say that this possibility of using large stones gives much freer rein to our architects. They can design nothing so bold and grandiose in conception but our stone-workers can carry it into execution. Throughout the country, even in the smaller towns and cities, there are countless public and private buildings adorned with massive columns, often monoliths, and with caps, lintels and platforms made of single huge stones. From time to time there have been illustrated in these pages buildings in which there are monolithic columns up to more than thirty feet in height, and weighing many tons. These can scarcely be matched in modern European work, and to find their equal one would have to go back to the great works of antiquity, executed by slave labor driven remorselessly through years of effort. The accompanying photograph shows a great capital, cut from a single stone. As long as our quarries and stone plants can turn out work of this kind, our architecture will continue to be the admiration of our foreign critics. There is no question of the ability and training of our architects, and they are favored with material and artisans that cannot be matched elsewhere.



A Massive Capital
An interesting illustration of American practice in cutting big blocks of stone

Sources of Potash in America

At the recent exposition of the Chemical Industries, held in New York, Linn Bradley, chief engineer of the Research Corporation of New York, read a paper on the sources of potash in this country that could be utilized to render us independent of Germany. Mr. Bradley quoted from a paper published by John J. Porter, general manager of the Security Cement and Lime Company, of Hagerstown, Md., entitled "The Recovery of Potash as a By-Product in the Manufacture of Portland Cement," which showed that from a three thousand barrel cement plant the operating profit on the potash alone comes to about $458,000, the raw mix having .75 per cent. of potash.

Data given by the Bureau of Soils in its survey of the cement plants indicate that the industry can be counted on to furnish eighty thousand to one hundred thousand tons of potash annually.

"The potentialities of the by-product recovery from blast furnaces," Mr. Bradley said, "would seem to surpass the possibilities of the Portland cement industry. Iron ores have been found in abundance in Alabama which carry from one to as high as three per cent. in potash and carry enough iron to make them highly suitable for this purpose.

"We now have sufficient furnace capacity to produce annually more than 1,500,000 tons of potash per annum, far in excess of our pre-war requirements. If the furnace charges and operations could be adapted so that one-fifth of the amount, or three hundred thousand tons, could be produced, this would meet our needs without assistance from any other source.

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Sand and Sandstones

THE numerous applications of sand in the building industries hardly need mentioning to prove that the substance is one of the most important for the builder. It is used in bricks and tiles, in mortar, for roadways, for glass making, for polishing and grinding plate glass, metals and stones, and as a cutting agent for marble. When naturally bound together, it constitutes sandstone, which has found so much favor in many quarters as a building stone. Sand, when strongly heated with soda carbonate, fuses to the mineral jelly known as water-glass—i. e., sodium silicate—and as this enters into the composition of artificial stones, the examination of sand is doubly appropriate. An interesting and valuable study of the minute structure and composition of sand and sandstones is contributed by James Scott to the London *Architect*. Mr. Scott says:

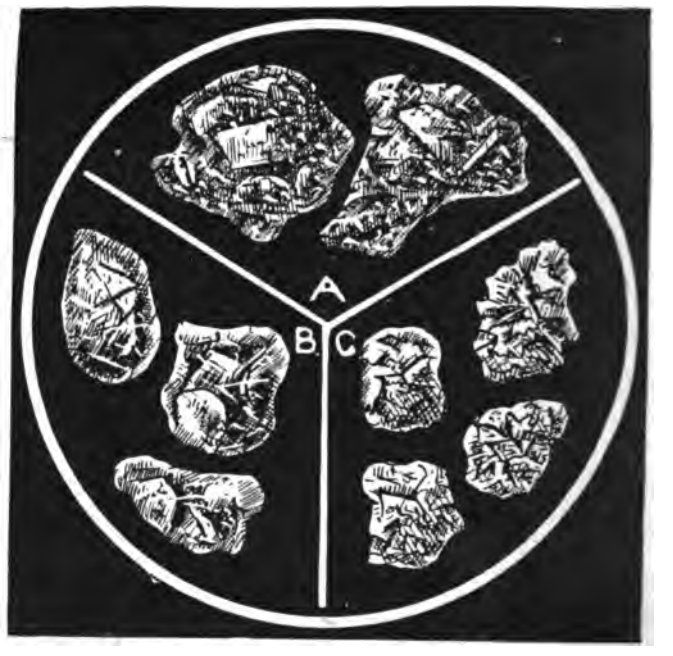
"Chemically, sand is silica, or oxide of silicon—that is, silicon combined with oxygen. It is curious that when we remove the oxygen from it, the remaining silicon is black. Silicon is the most abundant element on the earth, and in many ways resembles carbon; but it is never found alone, and its isolation is extremely difficult. Sand is its chief compound.

"Typically, sand is quartz; but it generally contains small amounts of other substances, such as lime, magnesia, potash and soda. Quartz, when pure, is a very hard, clear and transparent water-white mineral, which occurs in many beautiful crystalline modifications. Of course, it is an oxide of silicon; so is flint.

"It is probable that such rocks as quartz have disintegrated to comprise sand, subsequent amalgamation with coloring and other matters giving the grains their characteristic tints. It is a fact well known to petrologists that continuous exposure of such material to the action of the sun has slowly produced fractures, and the detachment of extremely fine particles; these afterwards being blown away by the wind, and finally settling as sand. Then rivers and floods have washed the substance onward into the sea, whence it has been redistributed in every direction.

"The yellow, brown and red colors of sand are due to its impregnation with iron oxide of different strengths. Iron oxide is a compound of iron and oxygen. Common rust is its most abundant, or, at any rate, best understood, form. It is possible to remove all this color by means of an acid, the best one for the purpose being hydrochloric. It is necessary to point out that the spirit of salt used by plumbers is often described as hydrochloric acid, which is quite true. But it is impure, whereas pure hydrochloric acid is water-white, and is the one to which my remarks apply.

"Place some sand—the redder it is the more effective will be the experiment—in a glass test tube or jar, and then pour over it enough of the acid named to completely cover it. There will be a rapid extraction of the color, and the liquid will disclose a greenish tint, since the dissolved iron will be in a ferrous condition. It can be changed into a brown-red one, or ferric, by further oxidation, by means of heat or exposure, and it is curious to note that in the event of a lot of the



SAND GRAINS GREATLY MAGNIFIED
Shown in space about one-twenty-fourth inch wide. A—sharp sand. B—common red sand. D—silver sand.

iron oxide being prepared in this way it would be possible for us to smelt it and procure the metal in its ordinary state. If some of the acid solution referred to, after draining it away from the sand, is gently warmed on a glass slide, it will yield some very attractive crystallizations. By treating the sand in this manner, and washing it with water, it can be entirely cleared of all iron, and become white and sparkling. Silver sand, or glass sand, has very little iron oxide in it, and is thus the purest, besides being very fine-grained.

"Some varieties of sand are shown magnified in Fig. 1, these being at average sizes. Some others are either larger or smaller. Green sand owes its peculiar color to saturation with silicate glauconite. Other colors are due mainly to some variety of metallic oxide, or similar combinations. Volcanic sand is exceedingly rich in various minerals, and from this kind we can, as a rule, obtain augite, enstatite, felspar, olivine and plagioclose.

"All sandstones consist of sand grains held together in a mineral matrix. The latter is, in composition, either siliceous—i. e., flinty—or calcareous—i. e.,

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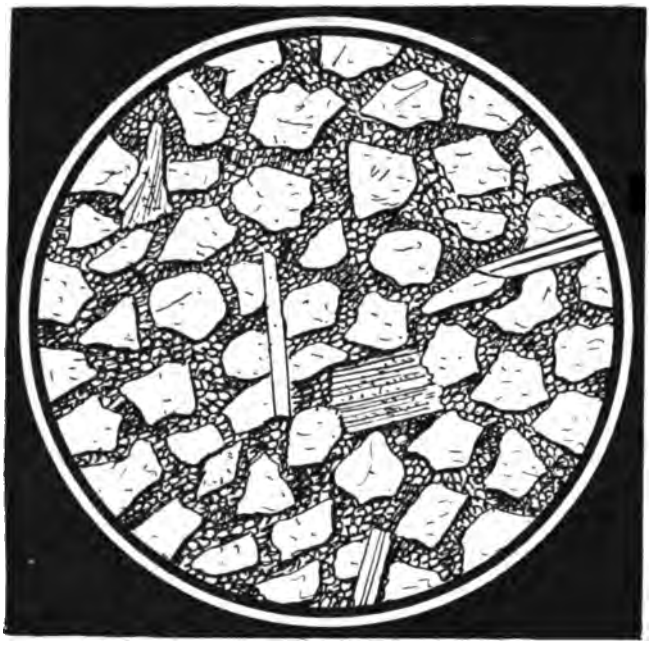
chalky—although sometimes a mixture of both sorts is present. At some time this matrix has been soft and penetrating. After having percolated between the voids or spaces caused among the mass of sand it has gradually hardened, and minutely crystallized meantime; thereby holding the grains quite firmly, similar to the action which follows their mixing-up in cement. Indeed, there is a close analogy between the formation and setting processes of Portland cement containing sand, and the development of sandstone. In each case the binding medium is what is known as crypto-crystalline—that is to say, it consists of various substances which have minutely crystallized, the impervious particles interlocking steadfastly, to produce a dense, compact result.

"Sandstones range from very hard to comparatively soft kinds, and like the loose sands, may be yellow, brown or red, on account of the action of iron oxide. The better qualities are very resistant to the weather. When a perceptible quantity of clay is present they are somewhat soft and gray in color, and are called argillaceous sandstones, of which ganister is a good example. Calcareous, chalky, or limey sandstones are still softer, and many specimens are so rich in the mineral indicated that they may be regarded as sandy limestones.

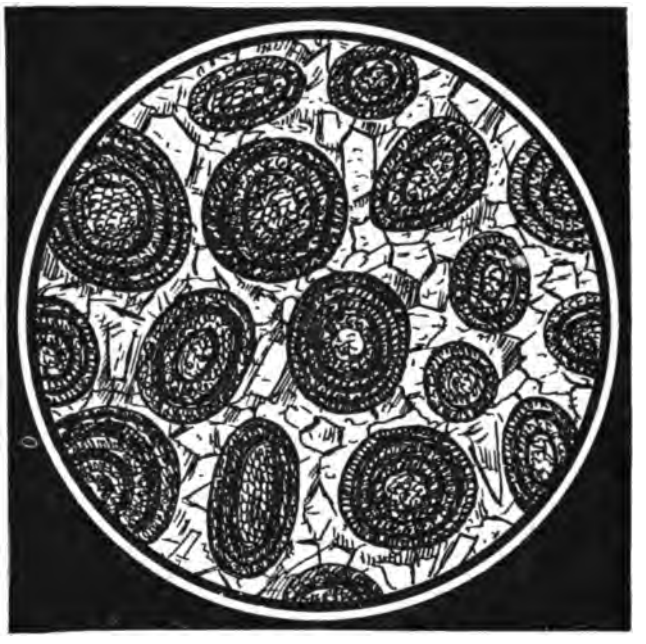
"Prettily mottled sandstones occur in some districts. The texture is occasioned by scattered scraps of dead organic matter—such as vegetation—having combined



THIN SECTION OF SANDSTONE MAGNIFIED
The grains consist of a transparent quartz embedded in a crystalline matrix

with the iron, thereby preventing it from mixing with the adjoining areas of sand, so that pale figurings contrast with dark surroundings.

"In Fig. 2 is shown a portion of a very thin slice of lias sandstone, ground (like the next selection) as thin as a piece of paper. The light is here passing up through it, the clear spaces therefore revealing the transparent sections of the grains, between which are the microscopic, binding, crystals of lime and silica. Dispersed throughout the stone can be found crystals



SECTION OF OOLITIC SANDSTONE MAGNIFIED
Some of the rounded concretionary grains are considerably larger than those shown

of other substances in addition, but these are only of minor importance, and do not call for separate mention.

"When the grains have been rounded—probably by attrition, during mass movements—they give a fish-roelike appearance or texture to the substance, and are for that reason called oolitic. Freestones belong to this group, and an example is shown in Fig. 3, the grains being somewhat large, and in many cases concentric internally, while the intervening matrix or binder is also fairly bold in crystal dimensions. In this case the grains are opaque, and the enveloping substance semi-transparent.

"In freestones the iron is commonly distributed with regularity. When it is intermittent and scanty we get the sandy flagstones. Flagstones, however, include limestones, quartzites and gneisses, and the name is not at all a definite one, albeit in some towns it has a certain distinctness from prolonged usage. But then, the study of rocks and minerals is confused by overlapping terms, and often a word has very little meaning apart from a particular branch of the trade.

"The disintegration of sandstone is traceable more to a mechanical than a chemical process, especially when the matrix or binder is, like the sand itself, of siliceous origin. We find that all sand grains are faintly cracked across in many directions. Sometimes the patterns thus produced are what are called conchoidal, or shell-like, and very minute. When such crevices, the fineness of which can hardly be conceived,

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extend deeply enough, and meet together, they carve out, as it were, tiny chunks of the material, and these fall apart as invisible dust. But it takes a very long time for a stone to suffer seriously in this manner.

"The softer sandstones yield also to chemical influences, the acids of the atmosphere reacting with their lime, alumina, and other amenable contents, the rate of decay being dependent on their particular composition. The actual sand, however, may be considered to be free from attack by smoke, vapors, fumes, and so on, except, as already stated, by merely physical weaknesses."

Stonework in the French Cathedrals

IT was long the belief of certain impractical people that modern inventiveness and the perfecting of implements of destruction, with the development of the aeroplane and the submarine, had made a great world war impossible and unthinkable. If we have awakened from this dream, we have found that our wildest imaginings had not prepared us for the appalling loss of life. Apart from the sacrifice of millions of our bravest and best, we were absolutely unable to conceive that the horrors of war would entail an incalculable loss to unborn generations until the remotest time. No one would have believed that nations calling themselves civilized could be led by any passion or despair to the wanton and needless destruction of works of art that form our most valued heritage from the past. The battlefields of Belgium and France, once a place of pilgrimage for all lovers of the beautiful, have been left a wilderness beyond the power of language fitly to describe. Nor are we permitted to doubt that if the advance of the Austrians had not bee n stayed, the whole of northern Italy, with its priceless art treasures, would have been laid in wilful ruin.

Belgium and Northern France contained some of the most magnificent examples of the inspired art of the mediaeval builders to be found in all the world—Gothic and Renaissance cathedrals, churches, chateaux and town halls. We know that many of the most beautiful of these have been wrecked down to the foundation stones, beyond all possibility of restoration. Some, we fondly hope, may eventually be saved, even if sadly marred by shell and fire. It will be the privilege of America to help in restoration of these marvelous structures, even as we shall assuredly aid in rebuilding ruined cities and re-establishing prostrate industries. We can contribute more than money, and the spiritual encouragement that counts for more than financial aid. It is not generally known that we have in this country by far the most complete photographic studies of the great Gothic cathedrals and churches of France anywhere in existence. These will form indispensable documents if the work of restoration is attempted.

For many years past Prof. William H. Goodyear, curator of Fine Arts of the Brooklyn Museum, has made careful and detailed studies of French and Italian churches, and the result of his work is hundreds of photographs of exteriors and interiors, as well as of architectural details. As to the number of pictures from individual cathedrals in France, which, in the instance of Amiens cathedral, reach the enormous total of 130, there are no other extant cathedral photographs, not even those of the Commission des Monuments Historique, which will exceed four or five interiors for an individual church. A word should be said as to the method of taking the photographs. The focussing was done with the aid of a magnifying glass. The lense was stopped down to the smallest aperture, requiring four times the usual exposure. By this means it has been possible to enlarge the photographs, even to the great size of 40 by 56 inches, without losing any of the sharpness of detail.

The Museum recently gave an exhibition of these enlarged photographs, including 66 exteriors and interiors of Notre Dame at Paris, and others from Soissons, Laon, Noyon and Beauvais. This has been followed by a second exhibition, still open to the public. This includes no less than 55 views of the exterior and interior of Amiens cathedral; 25 views of the matchless Rheims cathedral, and 10 of St. Remy and St. Jacques, also at Rheims; 17 from Chalons and vicinity, including the cathedral, St. Loup, St. Alpin, Notre Dame and St. L'Epine; 10 of St. Quentin; 5 of Rouen cathedral and 7 of St. Ouen, at Rouen. This is such an illlustration of Gothic stonework as could be seen nowhere else.

The purpose of this exhibition is to demonstrate the existence in all the mentioned churches of constructive refinements hitherto generally unnoticed or unappreciated by antiquarians and architects, aside from various notable recent exceptions which have been due to the Brooklyn Museum research represented by these photographs.

The so-called widening refinement is especially well represented by this exhibition. It is lacking in only one church of the entire series, namely the fifteenth century Gothic church of L'Epine near Chalons-sur-Marne. The widening refinement consists in a delicate outward inclination of the piers, vaulting shafts and clerestory walls of the nave, sometimes in straight lines and sometimes in delicate vertical curves or bends, which have the effect of curves. The cross section of the naves which have this construction has consequently an attenuated horse-shoe form. The result is

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to give an effect of spaciousness to the upper part of the church. The bending or curving vertical lines are also a feature of aesthetic beauty.

Several of these churches also have deflections in plan which are especially well represented by photographs from St. Ouen at Rouen, and from Rheims cathedral. The entire church of St. Ouen, including the line of piers, the clerestory walls and the outer walls of the church, is built on an attenuated S-shaped plan (the return curve which is sometimes called "Hogarth's line of beauty"). Among the most remarkable photographs of the exhibition are two taken in the north and south triforium galleries of St. Ouen, which show these curves. Another form of horizontal curvature is found in the clerestory walls, parapets and roof lines of Rheims cathedral, which are curved on both sides, concave to the nave and convex to exterior; whereas the pier alignment at the pavement of the church is rectilinear. These curves are represented by very remarkable photographs which were taken on the exterior of clerestory parapets. Similar curves are also found in the cathedral of Amiens, and are also well shown by photographs.

Apart from its artistic and architectural appeal, this exhibition has a wonderful interest for every stone man. It gives a most intimate revelation of the methods of the mediaeval stone-cutter and mason. Nearly all of the structures are built of Jurassic and Tertiary limestones. The cathedral of Amiens is of stone from quarries at Bonneleau, and the cathedral of Rouen of stone from quarries at Vernon. These limestones contain bands of siliceous material, and the result is that the stone weathers unevenly. This is most marked where rain has reached the stone indirectly, as underneath cornices, niches and entablatures. Partly owing to the nature of the stone, and partly, doubtless, to the racial characteristics of the stone-cutters, the finish is bolder and less refined than in the Italian churches, which are mostly of marble, and thus more tempting to the chisel. In the large wall spaces, the finish is generally in rough pointed work. The jointing, too, is bold, and all of this is in perfect keeping with the spirit of Gothic architecture, which is, above all else, the expression of the individuality of the craftsman, as free as may be, while yet in harmony with the great ideas of the master-builder. While this may be said of the masonry, it must not be forgotten that the hundreds of matchless, delicately carved figures on the façade of the Rheims cathedral were the crowning glories of Gothic statuary.

As regards the present condition of these churches and cathedrals, exact information is lacking in some cases; in others, the information is unfortunately only too complete. The present condition of Rheims cathedral is notorious. No mention appears to have been made in the public press as to the churches of St. Remi and St. Jacques at Rheims. The large church of St. Quentin, rivaling many cathedrals in dimensions, is wholly destroyed. Several bombs have fallen on the cathedral of Amiens. It was recently stated in the public press that "the cathedral was not irreparably injured." The town of Chalons-sur-Marne has been under fire from a distance, but has never been occupied by the German forces. The present condition of the churches at Chalons has not been mentioned in the American press. The cathedral of Rouen and the magnificent church of St. Ouen at Rouen are undoubtedly in good condition.

Domestic Sources of Pumice Stone

The domestic product sold as pumice has been, prior to 1917, almost wholly a finely comminuted volcanic dust or "ash" composed of minute fragments of pumiceous, glassy lava, not properly called pumice. This material differs inappreciably from the product made by grinding the imported lump or block pumice, for which it is a satisfactory substitute. The imported Italian pumice, which formerly constituted the bulk of the pumice used in this country, is a massive, very finely pumiceous and vesicular, glassy lava coming from the Lipari Islands, a volcanic group north of Sicily in the Mediterranean Sea. Very little pumice of this type had been obtained from domestic sources prior to 1917. In that year, largely because of the difficulty of shipping from Mediterranean ports, a considerable output of good grades of lump pumice was obtained from the vicinity of Mount Shasta and the Salton Sea in California, writes Frank J. Katz, in a Government report. Efforts were also made to exploit deposits of fair lump pumice in Coconino County, Ariz. On May 15, 1918, an absolute embargo on overseas imports of pumice went into effect, so that for the current year (1918), at least, consumers will be dependent on stocks of Italian pumice remaining in this country and on domestic supplies. These domestic materials, both the pumice dust from the Great Plains region and the western lump, have been and should continue to be satisfactory for all requirements other than the most exacting, which demand lump of very fine, even texture, free from discrete mineral particles (phenocrysts). Not over 100 tons per annum of such lump are ordinarily required, chiefly for lithographic work and for fine finish on copper, silver, and other metals before plating. It is probable that these needs can also be met by careful selection from domestic supplies.

Amiens Cathedral But Little Damaged

A short time ago a solemn thanksgiving service was held in Amiens Cathedral, showing that the building has escaped the barbarity of the Hun. As a matter of fact, from reports it is understood that the damage to this beautiful building has been very slight, although considerable damage has been caused to the buildings surrounding it.

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STONE

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VOL. XXXIX OCTOBER, 1918 No. 10

AN interesting leaflet sent out by the Committee on Public Information at Washington tells of various savings of raw material brought about by the War Industries Board. Some of these seem trivial in plan until it is learned what has been accomplished. For instance, three or four million yards of cloth were added to the national supply simply by obtaining a reduction in the size of samples of cloth issued by manufacturers. Again, in solder 50 per cent tin has been used and 50 per cent lead, but the Board finds that 40 per cent tin and 60 per cent lead makes just as serviceable solder, thus saving 20 per cent of our very limited tin supply used for this purpose. After recounting these and similar economies, the committee pays this deserved tribute to the people directly affected: "All these and many other similar savings have been effected with the assistance and cooperation of the industries involved. There has been no friction and little hardship. Industries have been put on a war basis not by the imperial ukase of irresponsible authority, as in Germany, but by the patriotic willingness of the nation to do everything in its power to help the war program. And through the War Industries Board, as through the Food Administration, the Fuel Administration and all the other war boards of the government, the American democracy has shown its ability to organize for war as thoroughly as the most servile victims of military autocracy have been organized by the most crushing despotism of modern times."

THE Commissioner of Labor of Vermont has declared the granite and marble industries of that state non-essential, and has advised the manufacturers to take up war contracts "in order to keep their organizations alive." The stone men of Vermont, and of the entire country, are just as patriotic and public-spirited as any class of citizens that can be found within our borders. They will make such sacrifices as they are called upon to undergo with good grace and without complaint, even if their industry has been harder hit than almost any other. In view of the confessed shortage of housing accommodations in all parts of the country, that is working a tremendous hardship to the public, they may question the wisdom of putting an end to building construction during the term of the war. But now that this has been decided upon, they will acquiesce, with a hope for better times hereafter. The suggestion to turn to other work in the meantime is not wholly practical. A stone plant has a special equipment unlike that of any other industry. It is difficult, if not impossible, to adapt it to a different line of work. The owners of a few plants, equipped with thousands of dollars' worth of expensive machinery, rather than see them wholly useless, have rented their sheds for storage purposes. This, however, yields a return that will scarcely pay the taxes. One of the great marble companies of Vermont has already adapted some of its stone planers to metal work and is finishing rough castings. But a stone company's organization consists of more than planer-men. This same concern has more than one hundred great gang-saws that cannot conceivably be used for war work. Besides the sawyers, there are channel-machine runners, quarrymen, carvers, polishers, rubbers, and a whole host of specialized trades that do not fit into war work. No, despite all well-meaning advice, if stone quarries and cutting plants must forego their usual work entirely, their "organizations" will inevitably become disrupted. England, which has been much longer in the war than the United States, realizes that the very rigid curtailment of building operations which she instituted was a mistake, and has already begun to modify the embargo. Today the whole world is dependent upon our manufactures, and these are in imperative need of greater housing facilities. Every one is agreed as to the wisdom and necessity of stopping all building for luxury and display. But homes are a necessity, and hotels, stores and office buildings, if we are to do our full share toward the winning of the war. If our building industry and our building material industries are crippled, our best efforts will be hampered before peace and normal conditions are at hand.

The Fourth Liberty Loan

As this magazine goes to press the campaign for the Fourth Liberty Loan is well under way, with every prospect of success. And it must be made a success. It is with no sense of self-importance that we say that the fate of the world rests in our hands. This is conceded by all our allies. The turn of the tide came when our fresh and vigorous troops marched by the hundreds of thousands, with flying colors, to the front, held for four long years by the war-worn soldiers of our European allies. It is not alone our troops that will help to the victory, but our moral, spiritual and financial aid as

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well. The first, second and third loans surpassed expectations, and we have not reached our limit yet. The ever-growing list of casualties brings home the cruel facts of the war to every part of this great country. Our best and brightest are making the supreme sacrifice in the noblest cause for which men have ever fought. If we can send our sons and brothers to face the bullets, we shall not hesitate to back them up by all the means within our power.

Perhaps we at home thought we had gone our limit when we paid for our bonds in the previous loans. But we shall find that we can make still further financial sacrifices and practice even greater self-denials. The records show that no less than eighteen million individuals purchased bonds in the third loan. With more than one hundred million people under our flag, we should be able to more than double the number this time. The success of the loan will not come from the allotment to the rich. They will do their full share, we may be sure. The triumph will come when those in humble circumstances set aside a dollar a week out of their scanty store to show the faith that is in them.

While patriotism and high ideals must spur us to our utmost, it is not necessary that we should put aside all thought of the value of this loan as an investment, pure and simple. We are loaning our money at a very high rate of interest, considering the security, to the richest government on the face of the earth. The loan is. moreover, an insurance, with the added feature that our premiums will all be returned to us with interest. If Germany and her allies should win, no one doubts that America would be called upon to pay the entire cost of the war. Our enemies have made frank announcement of this intention. It is better to hold United States bonds than to pay lifelong tribute to the rapacious Huns.

Lessons of the War

After the countless horrors of the war it is a relief to dwell upon some of the beneficial lessons it is teaching us. Apart from its moral effect and its spiritual stimulation, its bringing of our nation into greater solidarity and unity of purpose, one effect of the world conflict that we shall feel for years is the inculcation of thrift. The variety and abundance of our resources have always tempted us to prodigality, and the ease of making money has not taught us to save it. As it came easily, so we spent it freely. It needed the most energetic campaign of education and the most stirring appeals to our patriotism to turn us all, rich and poor alike, to the purchase of government bonds, the best and safest investment in the world today. We have been brought to buy these, not alone from our accumulated wealth, but from our daily savings, by constant and infinite self-denial and sacrifice. We are all learning the habit of thrift that will stay by us when the better times come again. Equally important is the movement forced upon us for the conservation of our natural resources. Economists have been preaching the necessity for conservation for years, but to dull ears. It needed the sharp lessons of the war to bring the matter home to us.

The shutting off of foreign raw supplies and manufactures has developed our natural ingenuity and resourcefulness. Three-quarters of a century ago our clipper ships were the wonder of the world and carried the American flag even to the distant isles of the Pacific. For more than a generation our merchant marine has dwindled almost to nothing. Now, at the imperative call of war, we are building, almost as by the touch of magic, great fleets of vessels, and soon our argosies will float in every sea. We have wrested from Germany her long-undisputed supremacy in the chemical and glass industries, and we are rendering ourselves independent of that country in many fields in which she thought herself indispensable to the world. When this war began, Germany practically controlled the world's supply of potash. Not only have we developed new potash fields in America, but we have found a way to take potash from the fine dust of cement works. Now we are independent of the German potash supply for all time.

The fuel shortage has worked many hardships, and unfortunately the end is not yet. The war program of the nation demands eight million more tons of coal this year than last. We are calling for eight million tons of steel ships, and to manufacture and deliver the steel for them will take fourteen million tons of coal. Three million tons are needed to carry our average monthly delivery of troops to Europe, and four million tons to transport their supplies. One hour of intensive artillery action at the front uses up 1,800 tons of steel, which takes 7,200 tons of coal to produce. To manufacture and transport the sixty million shells that were fired by the French in the battle of Verdun called for the consumption of nearly nine million tons of coal.

The demands for coal this year have increased in American industrial plants eighteen per cent, in gas and electric utilities fifteen per cent, in shipping thirty per cent, in the railroads seven per cent, and in domestic consumption thirteen per cent. It has been impossible to provide for these increases by increased production. There have been 224 new mines opened and weekly production has risen as high as a seventeen per cent increase over the corresponding week of 1917, but there has not been the necessary mine labor available to meet the whole demand and there have not been coal cars enough to keep the coal moving from the mines.

In an attempt to meet the deficit, the Fuel Administration has carried out a thorough campaign of saving. It has undertaken to inspect the country's 250,000 steam-producing plants, and hopes to save thereby twenty million tons of coal a year. As a result of this inspection, in Connecticut alone eighty plants are sav-

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ing 50,000 tons annually. One plant in Syracuse is making a saving that will amount to 10,000 tons a year. In the city of Chicago three plants are saving 74,000 tons by substituting electricity and water power for steam. Fuel has been conserved for essential war industries by limiting the amount used in many lines of business. The manner in which this drastic action has been accepted by the industries affected, as well as the voluntary restrictions imposed by the people themselves, serves a notice to Germany that America is in the war heart and soul, and means to fight it out, at any cost, until we shall force a just and lasting peace.

Speaking of Peace

There is still discussion of possible peace with Germany and there will continue to be speculation, no doubt, until peace is an accomplished fact. The curious thing about most of such talk is that Americans show so little understanding of their enemy in these speculations. For instance, recent newspaper stories that the German people are demanding a more liberal form of government and will force reforms, seem to buoy up most of our peace optimists.

The Germans demand a more liberal government! It is easier to believe that the Kaiser is on the front line trenches throwing hand grenades and dodging snipers' bullets. Americans who believe such propaganda, circulated from Berlin as an encouragement to more peace talk, only betray their ignorance of everything German.

Why should the Germans demand a more liberal government? They don't know yet that there is anything wrong with the one they have. If they did know there was anything wrong with it, most of them would not have any idea what to do about it; and if they had an idea what to do, they would not dare do it. The fact is the Germans are perfectly content with their government. They have been kept content by the simple process of keeping from them all the facts of the war. They are a large nation of placidly ignorant persons who are perfectly content to do only such thinking as is prescribed by a paternal military staff. From the time of the murder at Sarajevo to the present day it is doubtful if one German in a hundred thousand has learned one important truth about this war.

Their popular assembly, the Reichstag, is a debating society, but since the war even members of this debating society are not allowed to say anything the government does not sanction. The entire German press is under direct Government control, that forbids publication of a word of objectionable matter, to the national purpose of misleading the public. In addition to this source of misinformation, every spoken word brought to them by their "professors" and ministers of the church, is absolutely dictated by the same all-powerful government.

In Germany in war time, protest of any sort is "verboten." Expression of any sort of opinion, other than opinion laudatory of the government, is forbidden. Even thinking is decidedly dangerous. People governed as these people are will not find anything to criticise in their government until they find that the whole fabric is rotten. There is faint hope that they will make such a discovery during this war.

The German nation will not be defeated by any popular uprising. It will be defeated by the violent overthrow of the military ring that runs the nation. When the German armies are smashed, when the Prussian autocrats can find no more cannon fodder—Germany will make peace.

The way to defeat Germany is to send an American army of millions to aid our Allies in France and back up that army by subscribing every cent available to Fourth Liberty Loan Bonds. Men and money—those are the only arguments Germany can understand. Even when Prussian autocrats are beaten, it is too much to hope for popular reforms in the German government. It would not be surprising but that the ring, so long successful in duping a nation, will make its subjects enjoy defeat as some particularly desirable form of martyrdom.

But about that Americans do not care. Our business is to win the war and convince the Prussian boss of Germany that he can't fool other people as he has his own. And the only sure way of getting that business done is men and money—soldiers in France and Liberty Bonds to support them.

Government May Halt Work

The Federal Government is looking into the changes the city of Baltimore is making in the Mount Vernon Squares. It asked Joseph J. Hock, treasurer and general manager of the Arundel Sand & Gravel Company, for a report as to the cost of the work, the amount and character of material involved and the amoun' necessary to complete it. Mr. Hock has sent his report to Washington after a thorough investigation, and whether the work will be permitted to go on or be stopped until after the war depends upon the view officials at Washington take of it.

Part of the white marble balustrade for the north wing of the squares has been finished and the grading for a sunken garden in front of the Taney memorial completed. The Monument Street end of the wing is therefore practically ready for its final treatment, but only the grading has been done at the ends of the west and east wings. Work has not started on the south wing, where the greatest change is to be made, and which is to include a base for the memorial to Lafayette.

Washington Representatives of Building Interests

In accordance with the views of the Executive Board, it has been arranged with Mr. W. A. King, of Washington, for him to act as resident representative

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of the Federation for the next two months. Mr. King is very well known in building circles, being connected with the National Association of Builders Exchanges as their General Counsel, and in his law practice he is recognized an authority on many special features relating to building construction work in general. Mr. King has entered upon the task of his duties and already has on his hands several important matters, the outcome of which will develop from time to time.

Business Brevities

That her brother, William, may go into the army, Miss Margaret Wilson, of Harrisburg, Pa., assumed his place as secretary and treasurer of the Hoffman Brothers & Wilson Quarry Company.

The Lester Clay Co., of Attapulgus, Ga., will rebuild its fuller's earth plant, which was recently reported burned at a loss of $100,000.

Fire which started recently in the kilns of the Waukesha Lime & Stone Company, at Waukesha, Wis., did damage estimated between $12,000 and $15,000.

The Fish Stone Company, of Columbus, Ohio, has secured contracts for the stone for the addition to the Hospital for Epileptics at Gallipolis, Ohio, and the Ohio State Telephone Building at Delaware.

The Chamberlain Memorial Hospital, of stone and brick, has just been completed and opened at Rockwood, Tenn. The money for its erection came from the late Captain H. S. Chamberlain, for half a century identified with the business interests of Roane county, Tenn.

At one point of a road recently constructed in Alaska there is a solid ice foundation. At the surface there is a two-foot layer of moss and tundra, but previous mining operations at this point proved that there is a 40-foot bed of clear ice and 6 feet of gravel between the surface layer and bed rock.

The Roxbury Trap Rock Company has been awarded the contract for rebuilding the Belgrade avenue bridge at West Roxbury, Mass., at $43,500.

An employee of the Marble Cliff Stone Quarries, near Columbus, Ohio, was buried under fifteen tons of stone in a pit 21 feet deep, recently, and escaped with a few bruises. It took twenty men nearly four hours to release him. He was found lying in a crevice.

Roscoe Irwin, of Kingston, United States Internal Revenue Collector for the Albany district, has been appointed a member of the Yale Quarry Commission, which is to appraise property in Ulster County taken up by the city of New York for water purposes.

A Circle-on-Circle Arch

One of the common problems in stone working is the setting out of an arch circular in plan. To an inquiry on the subject addressed to the *Building World*, of London, the following answer is given:

The plan of the circle-on circle arch is given in Fig. 1, and the elevation of the face of the arch is shown in dotted lines in the left-hand half of Fig. 2. To get the true shape of the face of the arch, or development as it is called, divide 06 in the plan into any number, say six, of equal parts, and stretch the true length on the parts, out in a straight line as in the left half of Fig. 2. At each of the points 1, 2, 3, 4, 5, 6, in Fig. 2, raise an ordinate, as at 5. To get the height of this ordinate, draw a projector from 5 in the plan and measure the distance 5.5" in the elevation. This height transferred as shown to 5"' gives a point on the development of the soffit of the arch. The heights of the ordinates at 1, 2, etc., can be determined in a similar manner. The curve drawn through the tops of the ordinates then gives the developed curve. In the same way the development of the extrados of the arch and the lines of the label, shown here flat as in querist's drawing, can be found. The label projects 2½ in., and should be so drawn on the plan, but for the purpose of exposition it has been shown flush with the arch to simplify the drawing. The back of the arch can be developed in the same manner as that by which the face was treated; its development is shown in the right side of Fig. 2.

As the arch is to be built of two stones, A' B' C' D' (Fig. 2) is the face mould, and A" B" C" D" is the mould for the back surface of the arch stones. To get the bed mould, which

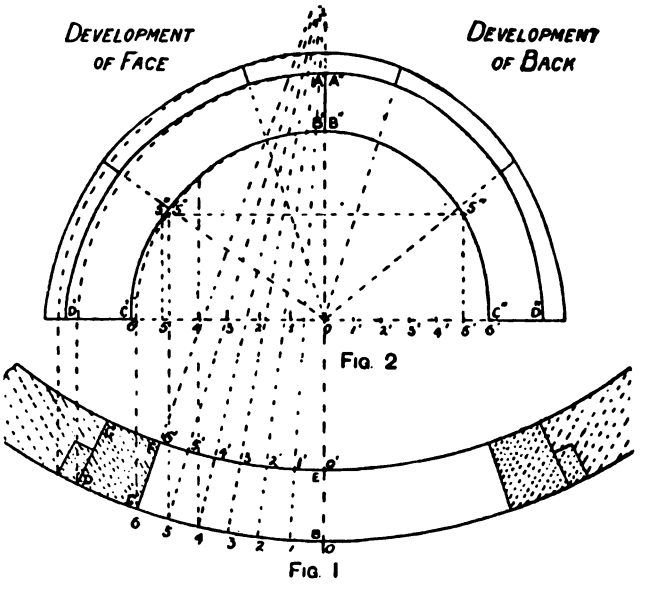

FIG. 2

FIG. 1

depends upon the shape of the stone to be used, hold a template cut to the shape o' G D O (Fig. 1) horizontally over the stone, after it has been placed in the position which allows of the stone being cut to the best advantage, and project by vertical lines points from the side of the template on to the surface of the stone. Then work the stone down in vertical lines from the points so obtained, and the stone will be ready for the application of the face moulds. If the arch is worked out to a reasonable scale in thin cardboard first, considerable insight will be obtained on the whole construction.

Government May Do the Work

Scarcity of labor and uncertainty of prices in the material supply market are believed to be the cause why no bids were received for construction work that had been planned on the Kentucky River locks and dams. Bids were called for but none were received.

Information is that all the plants engaged in the construction material trade are already so loaded up with orders that they can take no more. Much of their output is for the Ohio River dams. The Kentucky River improvements are estimated to cost about $125,000—the things required being timber, stone and cement. It is probable the Government may undertake the work itself, supplying the plant and hiring labor directly.

Employment in the Stone Trade

The reports from the manufacturing industries of New York State show the usual falling off for August in the number of employees, which indicates a drop of two per cent since July. With the exception of the chemical industries, where employees increased slightly, every group

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had a smaller number of operatives. Losses ranged from four per cent in the stone, clay and glass and in the clothing groups, to a fractional loss in light and power.

Marble and Granite

There has just been dedicated in the Catholic church of St. John, Utica, N. Y., a statue of the Virgin. It was made by the Bernardini Statuary Company, of New York, at its studio in Italy. It is of Carrara marble and stands on a base of rough rock.

One of the moving picture news features shows the entire process of quarrying Carrara marble, far up on the slopes of the Apuan Alps, cutting the blocks to size, getting the blocks down the precipitous mountain roads to the railway, and finally carving them into works of art.

Emil A. Mundt, who in January last retired as active head of the Pike River Granite Co., has again assumed charge of the business of the company. Mr. Mundt is the superintendent of the company's finishing mill at Marinette, Wis., and is operating the plant with a large force of men. The company's quarry at Amberg, which has been idle for a few weeks, may resume operations before long, it is understood.

TOWER AT NEVERS, FRANCE

Built about 1685. From a sketch by J. Tavenor Perry in the London *Architect*

Detroit has begun to receive some granite blocks for paving Detroit Avenue. Transportation conditions prevents the shipping of a full supply of the granite blocks, and wooden blocks will have to be used for two-thirds of the job.

State Commissioner of Labor R. W. Simonds, of Vermont, has called the granite and marble quarries of Vermont non-essential and has urged the owners to turn their plants into something useful at once if they wish to hold the men for after-the-war work. The granite manufacturers are to act upon the matter as soon as possible.

Owing to a reduced tax rate in San Francisco, the appropriations for the Board of Works this year has been cut $280,500. This will affect a number of granite cutters, who have been paid $6 a day.

Mr. Arthur Earle, who has given very liberally to the Liverpool Cathedral, has offered to the English city a large granite peace cross which is proposed to be erected at the end of the war, and it is suggested that it should be placed near the cathedral.

Thiele Bros., proprietors of a marble and granite works at Randolph, Wis., have closed out their business and will move elsewhere. Lack of trade was the reason for the change.

The contract for the granite work on the new building for the Walker Brothers Catering Company, Sixth and Perry Streets, Detroit, Mich., has been awarded to the Northern Stone & Granite Company, of that city.

The largest Catholic chapel in Central New York, connected with the new St. Elizabeth Hospital in Utica, has just been dedicated. The altars, finely carved, are of Carrara marble and were executed in Italy.

Limestone Turned to Phosphate Rock

Extensive phosphate deposits on Nauru or Pleasant Island and Ocean Island, located about midway between the Marshall and Solomon Islands, northwest of New Zealand, are said to be the most valuable deposits of the kind in the world, writes Consul General Alfred A. Winslow, from Auckland, New Zealand. The islands, of coral formation, have for ages been the rookeries of sea birds, which have deposited guano that has impregnated the limestone, forming phosphate rock forty feet in depth. The quantity of phosphate available is estimated at 500,000,000 tons, and as fertilizer it is said to rival the famous nitrate fields of Chile. This phosphate possesses 85 per cent. of manurial value, as against about 27 per cent. for the best English phosphate, according to a statement in the New Zealand *Dairyman*.

Before the war these islands belonged to Germany, but have since been taken over by the British Government, and now it is urged that they be turned over to Australia and New Zealand, since much of this phosphate is needed for the agricultural districts of these two countries.

Limestone and Sandstone

Dover, N. J., has just completed a handsome new high school, costing $108,982. It is trimmed throughout with buff Indiana limestone.

To meet an ever-increasing demand for limestone for fluxing purposes by the blast furnaces in eastern and central Pennsylvania, $250,000 will be spent in reclaiming the Millardsville quarries, on the eastern edge of Lebanon county, which were abandoned three years ago. For twenty years Jacob B. Millard, of Lebanon, operated the quarries, and now his son, Harry E. Millard, of Annville, who was associated with him for many years, has begun the work of reclamation. Purchase has been made of two farms adjoining the quarries, and Millard plans to develop the operation to a capacity of fifty cars of stone daily within a year. Showing the extent of the undertaking,

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orders have been placed for twelve carloads of machinery, including two pumps of 5,000 gallons capacity a minute and a third pump of 3,000 gallons to keep the operation below water level free of water. Seven locomotives, 150 stone cars, five steam shovels and a big crusher are included in the orders.

An involuntary petition in bankruptcy has been filed in the United States District Court at Newark against the Sussex Limestone Products Corporation, located at Hardyston township, Sussex County. Mr. J. Vincent Barnitt, of Paterson, has been appointed receiver. The Limestone Products Company is a large concern and its liabilities are reported to be large. Its assets consist mainly of machinery, derricks and locomotives. Recently, it is stated, a judgment against the company was obtained by Mr. Horn and Mr. Pearse, of Sussex County, who secured an order for the sheriff to sell the property. The appointment of the receiver will enjoin the sheriff from selling the property.

The Church of St. Saviour, Eighth Avenue and Sixth Street, Brooklyn, has just been dedicated. This is of the Romanesque style of architecture, and is trimmed throughout with Indiana limestone. The marble altar is completed, but has been detained in Italy.

The advantage of keeping a supply of Indiana limestone in stock is well shown in the case of a factory building in Grand Rapids, Mich., illustrated in the advertising pages. The contractor was enabled to get this good job because of his foresight in stocking up with a stone that is always in demand.

Construction Notes

The school board of Halifax, N. S., is receiving competitive plans for the erection of St. Joseph's school, costing $75,000. and Bloomfield school, costing $65,000.

The contract for erecting temporary barracks for the Provincial Government at Dorval, Que., costing about $225,000, has been awarded to Quinlan & Robertson, Ltd., 260 St. James Street, Montreal.

Burrell & McDonnell, Calgary, Alta., have prepared plans for a three-story branch bank at Moose Jaw, Sask., for the Merchants' Bank of Canada, Montreal. It will have trimming of Indiana limestone.

Snyder Bros., Winnipeg, have been awarded the contract for a telephone exchange for the Provincial Government at Russell, Man. The basement will be of Tyndall stone. The architect is J. H. G. Russell, Winnipeg.

The Clayton Company, Ltd., of Winnipeg, has been awarded the contract for the branch bank building at Virden, Man., for the Royal Bank of Canada, Toronto. It will be of Tyndall stone and brick.

The contract for the new $175,000 hospital at Billings, Mont., has been awarded to F. L. Veatch, of that city.

Messrs. Brown & Vallance, Montreal, have prepared plans for a $150,000 addition to the Central Y. W. C. A. building in that city.

The Boston & Maine Railway will build a $150,000 Y. M. C. A. building at East Deerfield, Mass.

Bids will be received by the State Armory Commission, Albany, N. Y., until October 24, for the erection of an armory at Troy, to cost about $350,000.

Hoggson Bros., 485 Fifth Avenue, New York, are preparing plans for a $100,000 addition to the Dime Savings Bank building, Canton, Ohio.

The Second Baptist congregation of Little Rock, Ark., will build a stone-trimmed church, costing about $75,000. The plans are by R. H. Hunt, Chattanooga, Tenn.

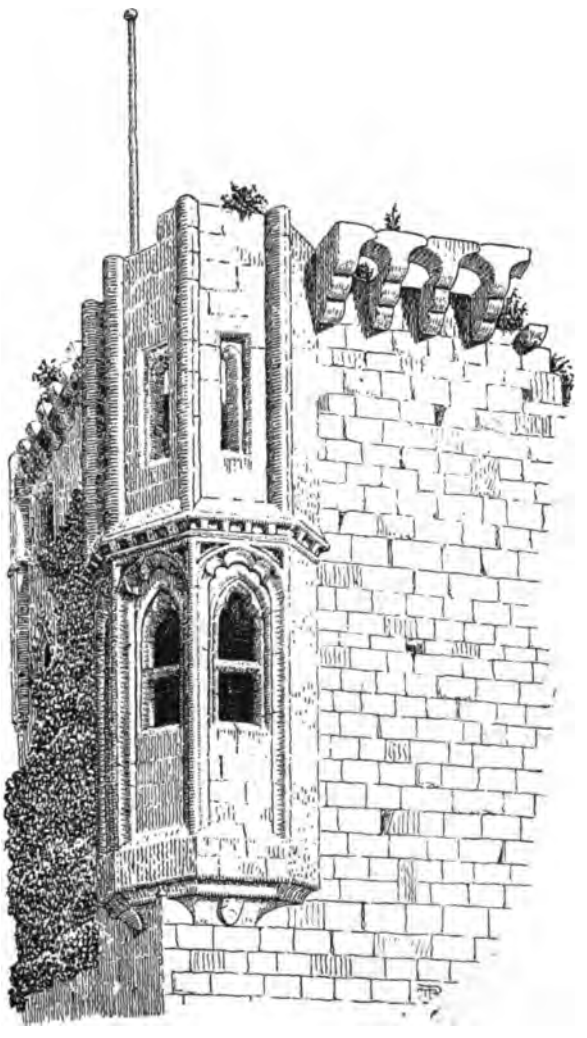
Messrs. Tonini & Bramblet, Oklahoma, are preparing plans for a stone and brick school at Heavener, Okla., to cost about $50,000.

The Palestine Association of Detroit, Mich., will erect a ten-story lodge building at an estimated cost of $250,000.

The State of Arkansas is planning an industrial home for women and girls at Little Rock, to cost about $100,000.

The Western Cartridge Company is planning to erect two hundred homes for workingmen at Alton, Ill., at a total estimated cost of $1,600,000.

All of the bids for the erection of a stone and brick high school at Bonner Springs, Kans., have been rejected. The architects are Smith, Lea & Leavitt, of Kansas City, Mo.



GAZEBO AT ASHBY-DE-LA-ZOUCH, ENGLAND

An observation tower on the ruined Keep. Sketch by the late J. Tavenor Perry

Racine, Wis., will expend $50,000 in remodeling its city hall.

J. Almand, Little Rock, Ark., is preparing plans for a $200,000 auditorium and armory in that city.

Messrs. Graham, Anderson, Probst & White, Railway Exchange building, Chicago, are preparing plans for a five-story Federal Reserve bank at Dallas, Tex., to cost about $500,000.

The Lincoln National Bank of Washington, D. C., will build an addition to its banking and office building, at an estimated cost of $500,000.

The contract for the erection of the Willapa Harbor

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State Bank, at Raymond, Wash., has been awarded to Trenchall & Perelius, Portland, Ore.

C. L. Harding, Washington, D. C., has prepared plans for a ten-story building for the Y. M. C. A. in that city. The estimated cost is $500,000.

E. B. Silver, Alliance, Ohio, has been awarded the contract for the erection of a hall for Mt. Union College in that city.

The Western Reserve University, of Cleveland, Ohio, is planning to spend $150,000 in the erection of dormitories.

O. Dolson, of Jerome, Ariz., has been awarded the contract for the erection of a group of hospital buildings for the United Verde Copper Company, at Clarksdale, Ariz.

Cole County, Missouri, has called for bids for a court house at Jefferson City, costing about $70.000. The architect is F. B. Miller, of that city.

Racine, Wis., will remodel its city hall, after plans by A. A. Guilbert, of that city. The estimated cost of the improvements is $60,000.

The Gallivan Building Company, of Greenville, S. C., has been awarded the contract for the main building of the Greenville City Hospital. The work will cost about $125,000.

The Shank Company, 30 North La Salle Street, Chicago, has been awarded the contract for a number of buildings, including hospital, dormitories, warehouses, shops, etc., at Maywood, Ill. The work will cost about $3,000,000, and upon completion the buildings will be taken over by the United States Government.

New Companies

Ohio Valley Sand & Gravel Company, of Boyers, Pa., incorporated at Wilmington, Del., to quarry stone, deal in sand, gravel, etc. Capital, $50,000. Incorporators: Peter B. Dickson, Walter K. Hamilton, Patsy P. Hamilton, all of Boyers, Pa.

The Hicks Fire Clay Products Company, of Springfield, Ill., to develope and operate clay lands in Scott county, Ill. Capital, $200,000. Incorporators: Charles T. Hicks, Edward C. Pearce and Walter C. Holmes.

Sand and Gravel Rates Stand

Announcement has been made by the railroad administration that it will not modify the order increasing rates on sand, gravel and crushed stone one cent per hundred pounds, as asked by producers. However, applications for specific modifications, the administration says, will be welcomed by district traffic committees, which are investigating applications for rate amendments.

Government Must Approve Highway Work

The United States Highway Council has made public its regulations, effective September 10, governing highway and street work during the period of the war. Federal approval is required for practically all highway construction.

"No manufacturer," the Council's announcement says, "will furnish any road building material until the project has been approved by the United States Highway Council."

The proposed work that should be first submitted to the United States Highway Council through the appropriate State highway department is defined as follows:

"All proposed highway, street, culvert and bridge construction, reconstruction and maintenance involving: (a) the issuances of bonds; (b) the use of rail or water transportation; (c) the use of coal or oil as fuel; (d) the use of cement, brick, asphalt, oil, tar, crushed stone, or steel (also sand and gravel where shortage exists) as highway material."

The Council urges that new highway and street construction be confined to most essential needs, and announces that it will give first consideration to the maintenance of highways already completed. Reconstruction is to be favorably considered only where it is clear that maintenance is no longer possible except at prohibitive cost.

Obituary Notes

Zacharia T. Merrill, vice-president of the Lake Shore Stone Company, of Chicago, died at his home in that city during the past month. Mr. Merrill was an old-time resident of Milwaukee, but took up his residence in Chicago seven years ago.

Theodore La Rochelle, a well-known granite manufacturer of Barre, Vt., died in that city the past month. Mr. La Rochelle was born at St. Bernard, Quebec, in 1850 and went to Barre twenty-one years ago. For several years past he had been associated with the granite firm of Dessureau & Co.

Alfred O. Diack, of the firm of Birnie & Diack, widely known granite dealers of Quincy, Mass., died recently in that city at the age of fifty-one years. He was born in Scotland, but went to Quincy when a youth. He was formerly a member of the city council, and at the time of his death was a member of the school committee.

The Monument Reporter

The Reporter, one of the oldest monumental journals in existence, which has been published continuously for fifty years, has changed hands. The magazine is now known as *The Monument Reporter,* and it has been reduced to the standard trade paper size. It is issued by the Reporter Publishing Company, at No. 12 South Throop Street, Chicago. Josef Rittmeyer is manager, and Charles O. Grimm, editor. The journal has always made a strong point of its practical features, and will be continued along the same lines.

Trade Notes

The Lidgerwood Manufacturing Company have opened their own branch office in the Union National Bank Building at Cleveland, Ohio, for the better handling of their contractors' hoists, mine hoists and cableway business in that territory. This office will be in charge of Mr. Ernest F. Pegg, who has been handling the Lidgerwood line for the W. M. Pattison Supply Company, their former agents, and is therefore familiar with all the Lidgerwood products, and well prepared to serve their customers in this section.

Zelnicker's Bulletin, put forth monthly by the Walter A. Zelnicker Supply Company, 325 Locust Street, St. Louis, contains full and attractive offerings of locomotives, cars, trucks, shovels, ditchers, skidders, loaders and machine tools. The company's machine department specializes in heavy machinery and power plant equipment. A copy of the Bulletin may be had by any one interested.

The Tompkins-Kiel Marble Company, 305 Fifth Avenue, New York, announce that since the opening of the Moretti-Harrah quarries at Sylacauga, Ala., they have handled over 100,000 cubic feet of the Madre Cream Statuary and Madre Veined Marbles. These are the only quarries operating in this section and Tompkins-Kiel Company are the sole sales agents. The company also has a large stock of blocks of the celebrated Eastman marble in all the different varieties. Added equipment at the quarries in West Rutland, Vt., will insure prompt shipments of this marble in quantities as desired.

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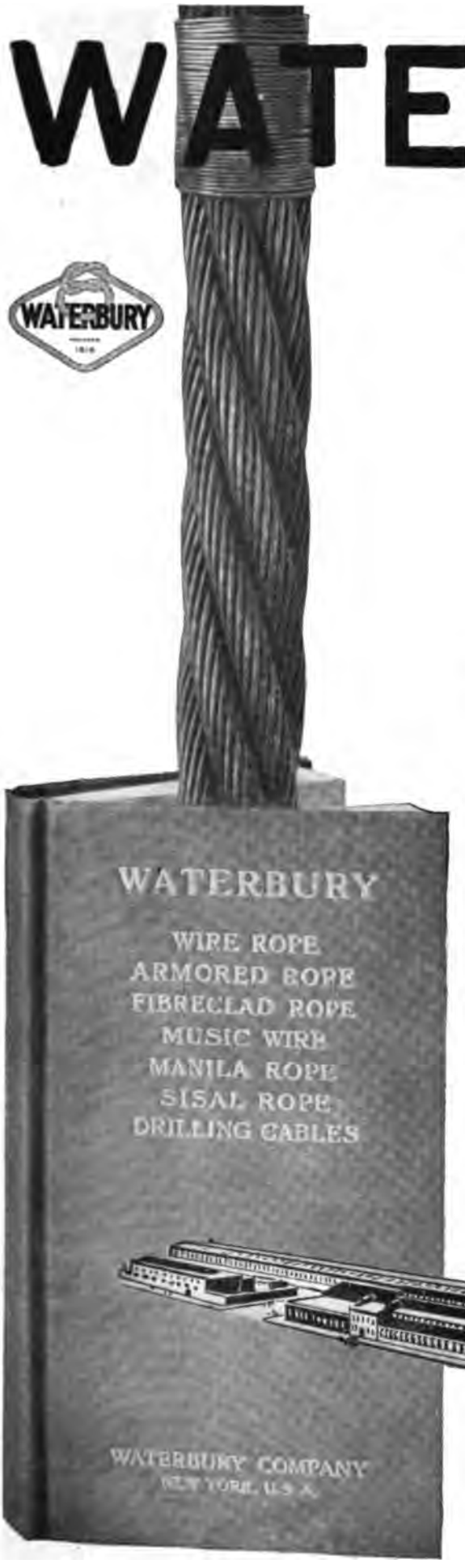

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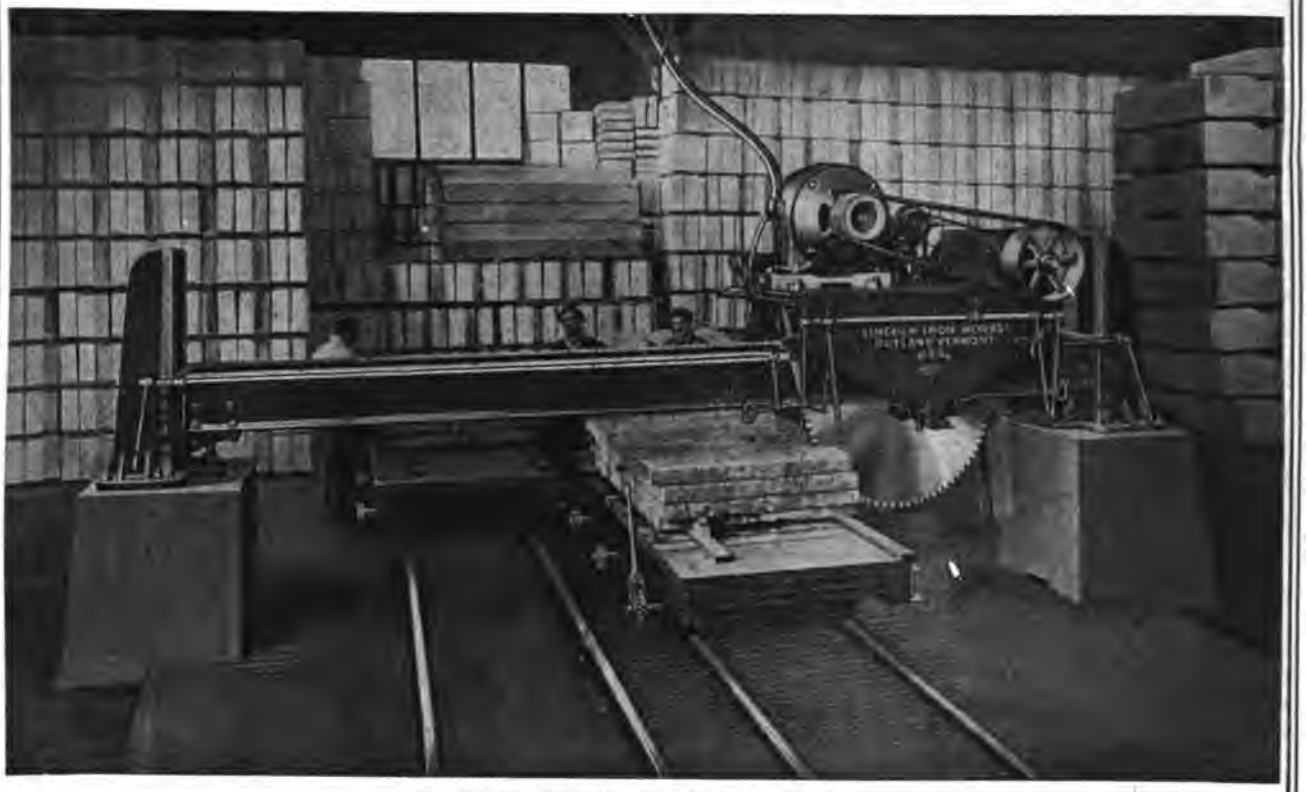

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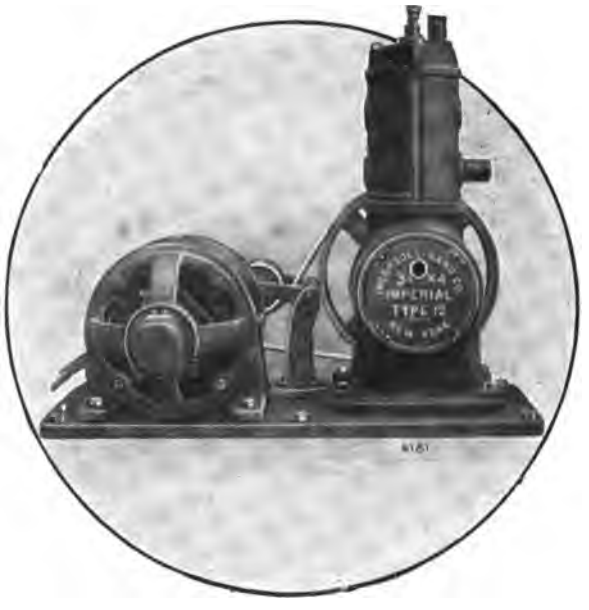

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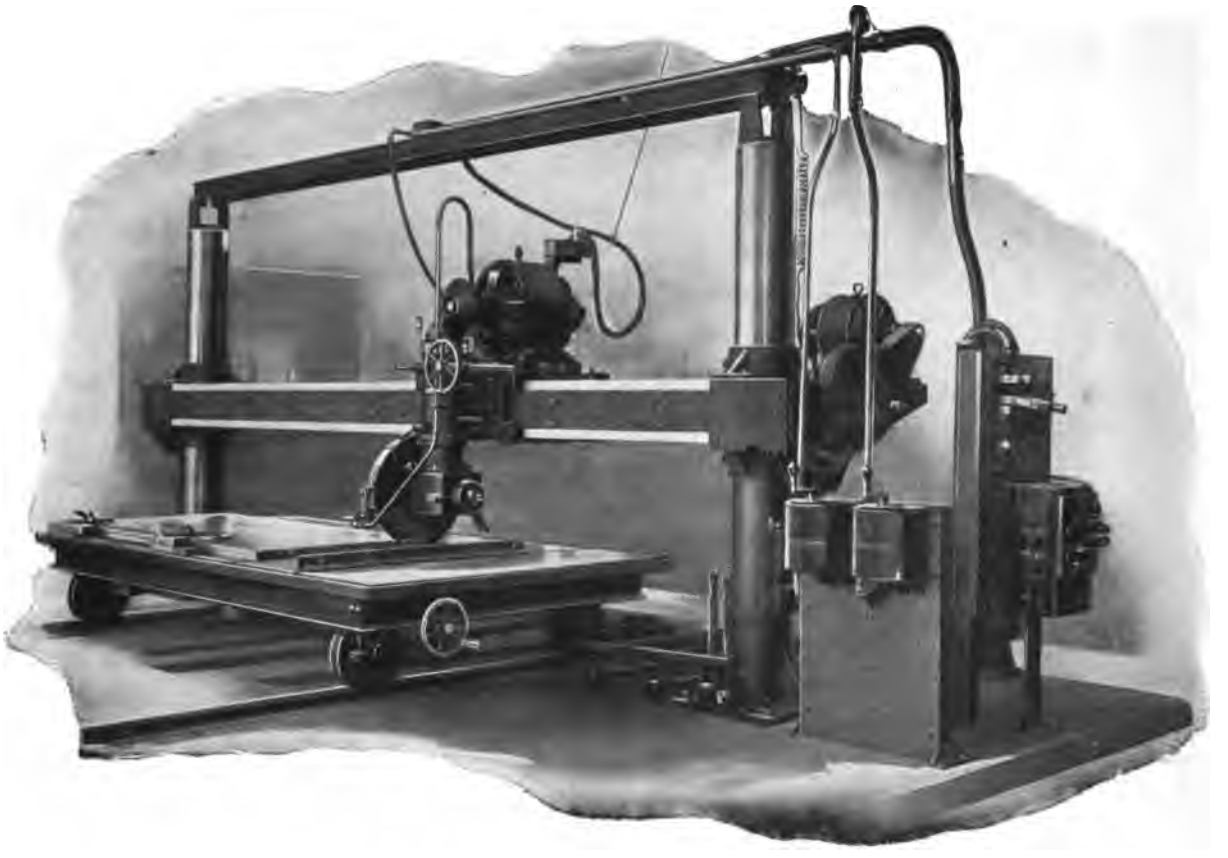

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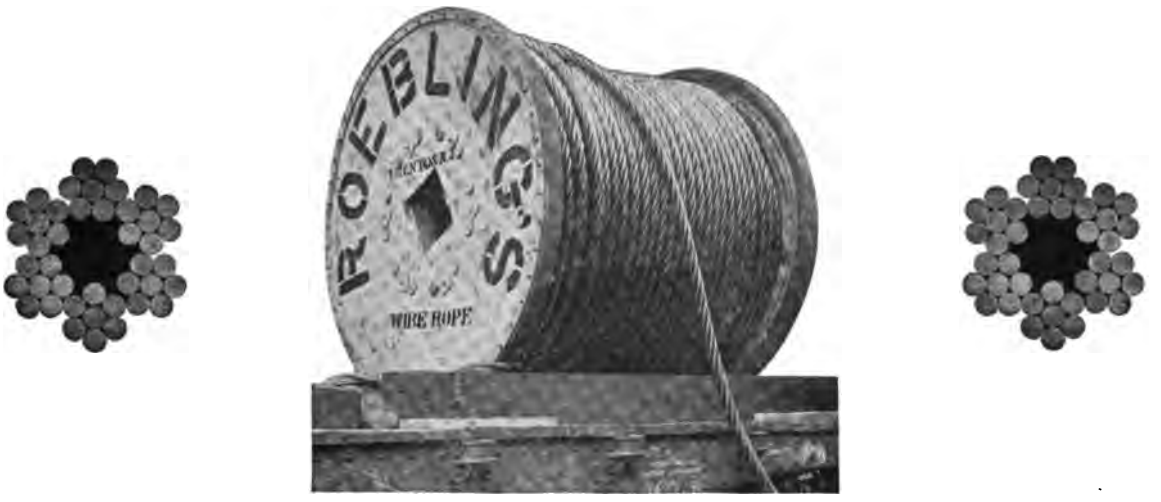

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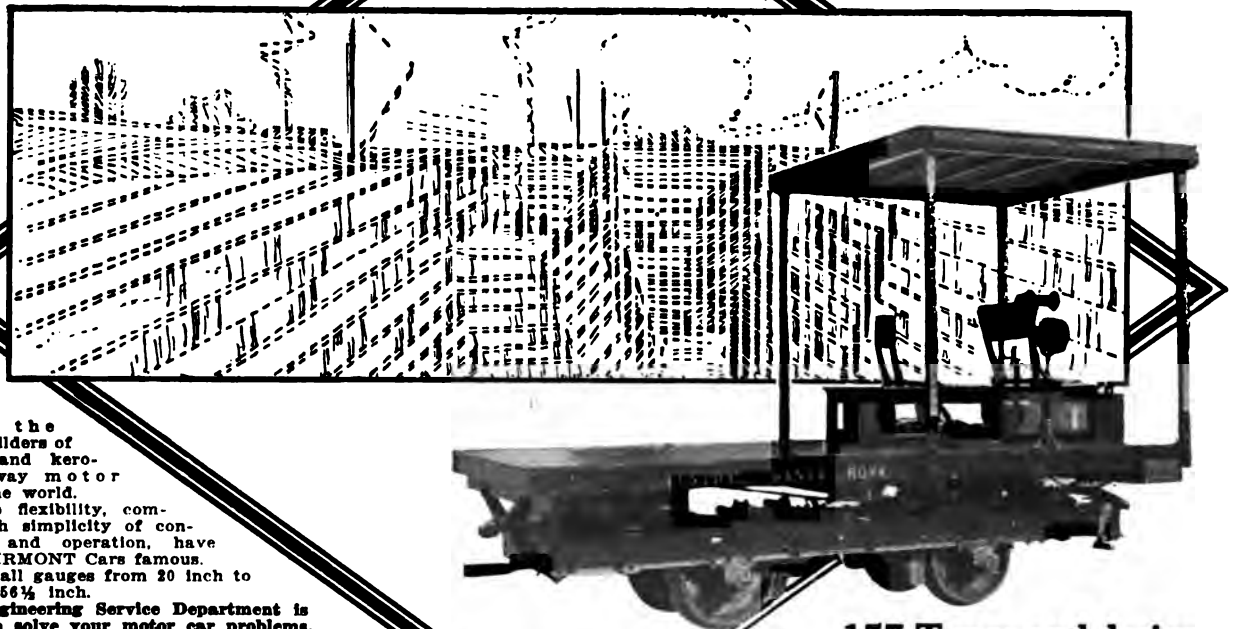

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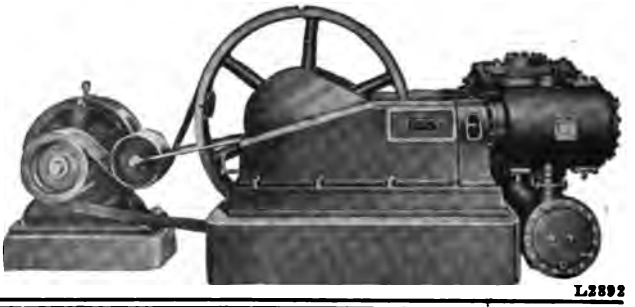

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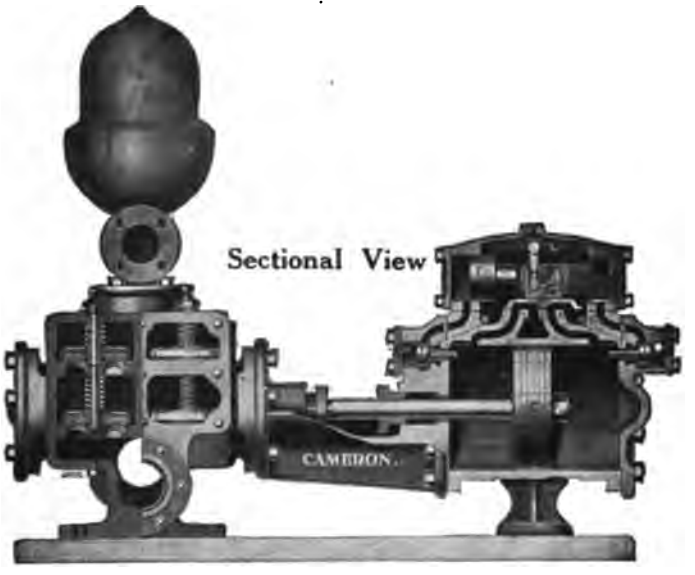

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VOLUME XXXIX | NOVEMBER, 1918 | NUMBER 11

CONTENTS

	PAGE
WHEN WE BUILD AGAIN	505
BUILDING STONE IN PALERMO	506
STONEWORK FOR THE PHILADELPHIA LIBRARY	506
THE STORY OF LIMESTONE	507
OILSTONES AND SCYTHESTONES	509
GOOD GRANITES IN IRELAND	509
LESS LIME BUT HIGHER PRICES	510
SLATE FLASHINGS FOR ROOFS	510
CANADA'S GREATEST STONE BUILDING, *illustrated*	511
TRIPOLI AND ROTTENSTONE	512
WHAT LIMESTONE IS WORTH ON THE SOIL	512
LABOR SAVING IN LIMESTONE QUARRYING, *By Oliver Bowles*	513
EDITORIALS:	PAGE
The Embargo on Building Lifted	516
Helps for Designers and Craftsmen	517
CHINESE STONE CUTTERS, *illustrated*	518
FIGHT OVER THE COLORADO-YULE PROPERTIES	518
BUILDING DURING THE WAR	519
UNUSUAL FEATURES IN A MAUSOLEUM, *illustrated*	519
WANT TO SAVE A STATE ASSET	520
BUILDING ACTIVITY IN COPENHAGEN	520
GOVERNMENT WORK	521
CLOSE-MITERING SLATES, *illustrated*	521
CONSTRUCTION NOTES	521
IMPORTATIONS OF GRAPHITE	522
ILLUSTRATION:	
Apartment House at No. 270 Park Avenue, New York.	

ALPHABETICAL LIST OF ADVERTISERS

	PAGE
Alabama Marble	499
Appalachian Marble Co	496
Ardolino Brothers	524
Bacon, Earl C	530
Barr, Thaw & Fraser Co	524
Bedford Steam Stone Works	524
Blum & Delbridge	524
Bowman & King Stone Co	524
Brodix & Malone	500
Brown, George & Co	503
Buckeye Gray Sandstone	502
Building Stone & Clay Products	524
Cameron, A. S., Steam Pump Wks.	535
Carthage Marble & White Lime Co.	524
Chicago & Bloomington Stone Co.	524
Clark-Conroy & Co	524
Cleveland Stone Co	10
Consolidated Stone Co., The	493
Continental Car Co. of America	529
Craig Co., John J	496
Dallet Co., Thos. H	533
Dark Hollow Gray Limestone	493
Empire Stone Co	524
Farrell Foundry & Machine Co	530
Falt & Co., J. P	494
Frenier & Son	530
Furst-Kerber Cut Stone Co	495
Georgia Marble Co., The	497
Gray "Canyon" Sandstone	501
Gray Eagle Marble Co	496
Gillies & Sons, James	524
Hanlein & Son, Henry	494
Harrison Supply Co	529
Heinlein Cut Stone Co., John	524
Hoosier Cut Stone Co	494
Indiana Limestone Quarrymen's Association	490-491
Indiana Quarries Co., Inside back cover	
Ingersoll-Rand Co	523
Laidlaw Dunn Gordon Plant	533
Lane Manufacturing Co	527
Lidgerwood Manufacturing Co	533
Lincoln Iron Works	526
Manning, Maxwell & Moore, Inc	530
Marble & Marble Workers	496
Marine, Arlando	524
McDermott Stone Co	500
McLaren & Sons, James	492
McMillan & Son, W	494
Mt. Airy Granite	503
Meyers Machine Co., Inc., Willard F.	528
Miller Co., David	524
Monahan Stone Company	511
Moretti-Harrah Marble Co	499
Napoleon Gray Marble Co	504
New Albany Machine Mfg. Co	530
North Carolina Granite Corporation	503
Ohio Quarries Co	502
Patch, F. R., Mfg. Co., Inside back cover	
Payne & Co., N. B	530
Phenix Marble Co	504
Pollard Mfg. Co., Ltd	531
Quincy Column Turning Co	500
Rockport Granite Co	500
Roebling's Sons, John A	530
Ross & Republic Marble Co	496
Royal Marble Co	496
"Silk of the Trade"	503
Shaw Electric Crane Co	530
Shea Donnelly Company	495
South Dover Marble Co	Back cover
Spurr & Son, J. J	492
Star Stone Co	500
Steam Stone Cutter Co	526
Struble Cut Stone Co., Henry	524
Structural Slate Co	523
Sullivan Machinery Co	529
Sutermeister Stone Co., A	524
Tompkins Kiel Marble Co	498-499
Tom-Kiel Cement	532
Trow & Holden	532
Victoria Marble Co	496
Waterbury Company	525
Winnesboro Granite Corp	503
Worthington Pump & Mach'y Co	533
Zelnicker	536

BUYERS' DIRECTORY OF THE STONE TRADES, PAGE 534
CLASSIFIED ADVERTISEMENTS, PAGE 536

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STONE

VOLUME XXXIX NOVEMBER, 1918 NUMBER 11

When We Build Again

THE public has acquiesced with remarkably good grace in the various restrictions enforced by the government because of our entrance into the war. Of course there has been argument as to the necessity for some of the regulations, but once it has been demonstrated that they were absolutely essential if we were to "carry on" to our full ability, all complaint, and grumbling has stopped, and only patriotism finds expression. It may be doubted whether any of the changes have directly affected more people than the curtailing of building activity. With the readjustment of industries and the creation of gigantic new ones, there has naturally been a great shifting of population. The housing problem, especially in the vicinity of the munitions and shipping plants, has become very acute. Throughout Northern New Jersey a vigorous "Rent a Room" campaign has been waged, even in the small suburban towns that had not expected any decided growth in population. Even the large cities have suffered from the shortage of buildings, business structures, factories, hotels, apartment houses and residences. The condition of affairs in Washington in the lack of housing is well known. Philadelphia and New York are in almost as bad a state. Of course rents have gone up, but this affords no relief, except to the landlords. Here in New York we have completed elaborate new transportation systems that open up great sections for settlement. But this counts for little until the houses can be erected.

Until the war ends and the movement of our troops ceases, the Government control of what it has classified as essential and non-essential industries will be maintained. In discussion this condition and the resumption of building that must shortly come, Allen E. Beals, secretary of the Dow Daily Service Reports, says that control does not mean that building will not go ahead. Indeed, it cannot much longer be restrained, for when commerce and trade perforce must seek much greater space to meet demands once centred in the boundaries of our own domestic shores, but which within a half a decade have expanded around the world the seeds of residential emigration start to germinate and New York once more packs up and shifts her housing and department stores to sections further north. Just now there is no place for the migrating Gothamite to go, for apartments are all filled and green fields tapped by subways recently transformed to suburb connecting tubes, holds much of hope but little actual housing for the cramped but patriotic worker who goes to his outgrown living place at each day's close.

Another half year will cast new light upon the housing problem of New York, but tremendous reconstruction work will long precede full freedom of construction in any but commercial and commerce breeding building work, like terminals, warehouses and hotels. Whole sections of New York must be reclaimed. The buildings that transformed the city's skyline in the half century that has passed will be remade and re-equipped with modern appliances, and these will be the most successful form of building work until the reactionary forces set to work to give peace industries the right of way.

To make comparisons with costs of construction of only two eventful years ago will show at once just why construction has been curtailed. Investors under war conditions fix the rents that cost of materials and delays in assembling them demand, plus 6 to 10 per cent. and overhead. Manhattan rents advanced twenty-five per cent. between the time we entered the war and the following renting season. Today there is another 10 per cent. increase at least, all charged to actual demand and higher cost of maintenance. Most arbitrary policies are submitted to in many instances by tenants who dare make no direct complaint, and even in the smaller types in close suburban towns the owners have been asked to buy the property or relinquish it to those who would gladly own the place to end their house hunting quests.

First-class office building costs have risen 74 per cent. within the eighteen months just passed. Loft buildings had advanced last autumn from the year before 62 per cent., while materials called for in a high-class apartment house will cost 94.3 per cent. more than it did just two short years ago. Today there is no quo-

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tation good from day to day in any line, each building project standing on its merits and the architect or contractor accepting figures given as of date with quotations due to change without advance advice.

We have frequently made the statement in these columns that the advance in the cost of stonework has been less than in almost any other line of building construction. This fact is well borne out in the various figures compiled by Mr. Beals. The wages for labor in different branches are contrasted for the years 1918. 1917 and 1916. These show far less advance than in many industries. The following have remained unchanged: Bluestone cutters and setters, $5.00; marble cutters and setters, $5.50; stone cutters, $5.50; tile-layers, $6.00. The pay of mosaic workers has advanced to $5.00 from $4.50; slate and tile-roofers to $6.25 from $6.00, and stone-setters to $6.50 from $6.00.

Much the same condition is shown as to the materials of construction. All of the materials that would enter into the construction of an apartment house, for instance, show an advance in 1918 of 94.3 per cent. over 1916. But stone-work is much below this average. Exterior limestone shows an increase of 33.0 per cent.; granite, 41.0 per cent.; interior marble, 31.1 per cent., and masonry, 42.0 per cent.

If one would consider the building material situation and construction industry as a whole, says Mr. Beals, involving as it does two professions, those of architecture and engineering, a normal volume of business running into more than a billion and a half dollars a year reduced this year to a probable total of less than $500,000,000, outside of government construction work, for the entire country, some idea may be obtained as to the sacrifices the building industry has laid upon the altar of patriotism.

Offsetting this, however, must be added the $60,000,000 that the Government has already appropriated for housing of munition workers, but this does not and cannot affect many hundreds of thousands of other people who must find living quarters, with absolutely no hope of Government interest in their behalf and with equally hopeless prospects of the private builder being permitted to take care of their requirements as long as the Government's war needs control the purse strings of institutions and individuals who make a business of making building loans.

Building Stone in Palermo

The principal building material used in Palermo is a soft stone known as "tufo." This stone is very soft and light, is easily quarried, and hardens on exposure to the air. It is an excellent and cheap building material and is of attractive appearance, being light caramel in color. In fact, this stone is so easy to quarry that even temporary walls around vacant lots and building operations are made of it in preference to the board fence seen in the United States. All exterior walls are made of this "tufo." The walls are about 18 inches thick and are generally covered with a coating of cement stucco, though the stone itself when dressed properly makes a very neat appearing building without any stucco. Most interior partitions, which are almost as thick as the exterior walls, are made of this stone. There is no wood used except for windows and doors and their frames. Steel I-beams are used for floor beams. Hollow tiles are laid between these beams and on top of these the glazed floor tiles are laid, bedded in a strong cement mortar. Wood floors are rare and are found only in hotels and in the houses of the wealthy, being generally parquet flooring. Stairways are of marble, with iron banisters, the latter occasionally having a handrail of wood. All houses have tile roofs.

Stonework for the Philadelphia Library

When the city of Philadelphia determined to erect its magnificent Free Library Building, the contract for the work was awarded to John Gill & Sons, of Cleveland. Naturally the contractors reserved to themselves the right to purchase materials and have work done in the cheapest market, but all progress on the job was held up by legal action. Walter R. Taylor brought a taxpayer's suit against the City of Philadelphia, the Mayor, the Director of the Department of Public Works, the Board of Trustees of the Free Library, and John Gill & Sons under city ordinance that all stone entering into work done under contract with the City of Philadelphia must be cut and prepared in that city. The suit was brought in the June term, 1917, and F. C. Newbourg, Jr., and W. B. Linn appeared as attorneys for the plaintiff and John P. Connelly, city solicitor, J. Washington Logue and Henry, Pepper, Bodine & Pepper as attorneys for defendants.

After full hearings of the case, Charles Y. Andenreid, as presiding justice, on October 2, 1918, ordered, adjudged and decreed:

"1. That the ordinance of the City of Philadelphia approved November 26, 1894, entitled 'An Ordinance relating to the preparation and use of stone that may enter into work done under contract with the City of Philadelphia' is illegal and void.

"2. That the Ordinance of the City of Philadelphia approved December 28, 1895, entitled 'An Ordinance to amend an Ordinance approved November 26, 1894, entitled "An Ordinance relating to the preparation and use of stone that may enter into work done under contract with the City of Philadelphia" ' is illegal and void.

"3. Under the contract as awarded to John Gill & Sons the City authorities defendant are entitled to the credit of $110,000 specified in Item No 1-a of the proposal of Gill & Sons made part of the contract awarded to him by the City.

"4. That defendant, the City of Philadelphia, pay the costs."

This decision will, of course, prevent efforts to restrict and restrain the shipment of cut stone for all municipal work in Philadelphia.

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The Story of Limestone

FEW people stop to realize the important part that limestone plays in the daily life of humanity. It is one of the most widely disseminated of rocks, and it has been utilized by man from the very dawn of civilization. Its primal use was as a building material, and some of the very earliest structures reared by the hand of man of which we have any record are of this stone. Whether as the dense and massive rock used strictly for structural purposes, or in its crystalline and highly colored form as marble employed for decoration and in the arts, it has always been one of the most important varieties of stone. The effect of fire in transforming it into lime early became known, and thus furnished to man the mortars needed to secure stability in masonry. It replaced the "slime" or mud which, according to the Bible, was used by the primitive peoples in their building construction. But the use of limestone for hundreds of other purposes, most important in the complexities of modern life, has been the growth of the past generation or two. The following is only a partial list, but limestone is now used in the preparation of or as the basis for: Acetate of lime, acetic acid, agricultural limestone, ammonia, ammonium sulphate, basic steel, blast furnace flux, bleaching powder, bone ash, building stone, calcium carbide, calcium cyanide, calcium nitrate, carbon dioxide, chloride of lime, concrete aggregates, disinfectant and deodorizer, dyeing, fertilizers, finishing lime, gas manufacture, glass making, insecticides, lime burning, lithographing, milk of lime, mortar, oil fat, glycerine and soap manufacture, paints and varnishes, paper making, Portland cement, potassium and sodium dichromates, pottery glaze, refractory bricks, road material and railway ballast, sand lime bricks, soda ash products, potash and ammonia, sugar manufacture, tanning wood, distillation of wood alcohol, water softening and purifying.

A very interesting story of limestone, its nature, formation, preparation and use, is contributed by Mr. S. R. Russell to the Du Pont Magazine. Mr. Russell does scarcely more than hint at the important part that limestone plays in the history of archi-

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tecture and art. From the Parthenon at Athens to the Lincoln Memorial in Washington, thousands of buildings which have won deathless fame for their beauty and grandeur, have been of limestone, or as we call the stone in its crystalline form, marble. For this reason it is unfortunate that Mr. Russell listed the Cathedral of St. John the Divine in New York among the limestone buildings. As stone men know, the outer walls of this great edifice are of yellow granite quarried in New York state forty or fifty miles from the site, while the heavy structural features, like the foundation and the great arches of the crossing, are of Maine granite. It is true, however, that the interior finish is largely of yellow limestone from Minnesota, and that Indiana limestone and many rare marbles have been freely used for trimming and decoration. In the same way, only a part of the National Capital is of marble, a portion of the walls and some of the large columns being of sandstone. Mr. Russell says:

"One of the most common stones, and one of the most useful, is limestone. It is used everywhere in one form or another, and is found in practically all parts of the country.

"In its simplest form it is a rock formed by the combination of either calcium or magnesium with oxygen and carbon. Magnesium and calcium are both metals that closely resemble tin or zinc in appearance. Oxygen is the life-giving part of the air. Carbon dioxide is the gas given off when breathing. The combination of these gases with either of the metals makes the many different kinds of limestone. Each of the metals produces its own peculiar kind of stone, and each kind of stone has its many uses.

"The combinations described in certain forms of crystallization make clear stone resembling glass, which is found in but few places. Elsewhere there are other substances or impurities that produce a great variety of colors and add peculiar characteristics.

"Like all things else, limestone had once to be made or created. In one form it was built under water by myriads of tiny animals that extracted the rock-forming materials from the sea water in which they lived and deposited them in fantastic forests of coral; in another, it was made by accumulations of shells of different kinds; and in others, by being deposited or precipitated out of water in which it had been dissolved.

"By these different methods have been developed many kinds of rock and all limestones, varying all the way from the most delicately colored onyx and whitest marble, through many classes of the ordinary limestone, down to the slimy or muddy matter closely resembling ordinary earth. From the different classes or qualities are prepared many necessary materials, as well as the finest gems of art.

"Thus, the most beautiful marbles, which when hewn and shaped by man's hand produce the greatest works of statuary in the world of art, are in reality nothing but limestone. The famous Coliseum of ancient Rome—the largest theatre the world has ever known—and the more modern St. Peter's in the same city were built of travertine, a form of limestone, and are the finest examples of the use of limestone in architecture. To come down to this time and generation—the National Capitol and Washington's Monument at Washington and St. Patrick's Cathedral and also St. John's at New York are striking examples of the beautiful and impressive structures built with limestone.

"In addition to the ancient and beautiful uses limestone plays a most important part in the commercial and industrial life of the world. One of the most valuable of the industrial uses is in the refining of metals, where it is used as a 'flux,' in which capacity it brings about easier melting of iron and collects or separates out of the molten mass certain impurities. It would be practically impossible to make iron or steel without limestone, especially on the scale on which these things are produced, and millions of tons of it are used in the steel industry alone.

'Limestone is burned in kilns to produce lime, which has such a wide use and is so familiar to everyone that its necessity is often forgotten. The burning of lime is a simple matter in principle, and is brought about by roasting the hard rock in large kilns. This drives out the carbon dioxide, and leaves only the metal and oxygen. In this form it is known as 'quicklime,' and is used in the making of mortars and plasters and for the treatment of soils.

"Concrete is a substance known to everyone, and is one of the most essential materials to modern civilization. It would be impossible to make the cement used in concrete without limestone, as it is prepared from this material mixed with certain kinds of shale. This fine sifted cement it mixed with sand, stone, and water to make the finished concrete. For this last purpose the use of limestone has reached gigantic proportions.

"At this time the subject of roads and transportation is more than ever of importance. Limestone in the raw state is crushed and sized to make possible the improved roads and highways and to render safe modern railway travel by its use as railroad ballast, and is used in countless other necessary ways.

"On the farms, especially those of the central and eastern states, millions of pounds of lime—either as finely ground limestone or as burned lime, which before application to the soil may be slaked—are needed to 'sweeten' the soil and make possible the better production of important food and forage crops.

"Not satisfied with its conquests in the uses already described, limestone has become an important factor in chemical manufacture, where it is used

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to produce caustic-soda, soda-ash, salicylic acid, baking soda, and a variety of kindred compounds. Even the refreshing glass of soda water and many other sparkling drinks owe their very existence to the gas derived from limestone. The sugar with which they are sweetened required lime in its preparation.

"The story of the progress of limestone from the quarry, where it is won from massive beds or ledges, to its ultimate use is most interesting. The methods differ, depending upon the use that is to be made of the stone. For the gigantic building blocks and slabs the most painstaking care is required to prevent the shattering or cracking of the desired pieces. In this case the top or useless earth and stone, called 'stripping,' is removed to expose the solid, usable rock. This is cut off in blocks or slabs by different means. Sometimes the sections are laid out by holes drilled close together to afford entrance for wedges or light charges of blasting powder. Sometimes these holes are drilled so close together that the desired block is practically cut from its original resting place. Heavy machines are now used in some quarries, and actually chisel blocks of almost any dimensions from the parent ledge. These blocks are later sawed, chiseled, and planed into the desired shapes and sizes, or they may be sculptured into the most elaborate designs or figures.

"For the greater use of limestone this care in quarrying is not required, as the stone must ultimately be broken into small fragments, and more vigorous methods are employed. These are all based on the use of explosives. Holes are drilled into or under the stone that is to be broken, and loaded with carefully estimated charges, depending upon the amount of stone that is to be broken. When the holes are small or shallow, only a few pounds of dynamite are required, but for winning large piles of broken stone, long rows of wells are drilled back of the 'face,' or wall of the quarry, and loaded with tons of explosives. All of the holes are fired together, and a successful shot brings down a veritable avalanche of broken rock.

"Another method, popular in parts of the country, is to drive or dig tunnels under great masses of limestone and pack the ends of the tunnels with hundreds of kegs of powder and some dynamite. Such a blast actually lifts the mountain or hill, and shatters the rock in much the same way as the loaded wells.

"Explosives are always required in tearing the limestone from the mountainside, and somewhere far back in the history of the steel rail, carving knife, toothsome bonbon, or sparkling soda, there was a heavy thud as the confined explosive started into action, and a roar of falling stone as it achieved its purpose."

In another column technical suggestions are given by one of the foremost experts in the country on economies that may well be adopted in quarrying limestone in the form of rough and broken rock for industrial purposes. The American limestone quarries producing dimension stone are among the most scientifically equipped of any in the world.

Oilstones and Scythestones

The production of oilstones and whetstones, hones, scythestones and rubbing stones in the United States during 1917 amounted to $168,704, an increase of $14,131, or 9 per cent, as compared with 1916, and of $53,529, or 46 per cent, as compared with 1915. The value of the output has not yet risen to the magnitude attained prior to 1914.

Production of oilstones and whetstones was reported by seven quarry operators in the Hot Springs district of Garland County, Ark.; by three in Orange County, Ind.; and by one in Scioto County, Ohio. Production of scythestones was reported by one quarry operator in Orange County, Ind.; by one in Huron County, Mich.; one in Grafton County, N. H.; one in Cuyahoga and one in Scioto counties, Ohio; and one in Orleans County, Vt. Rubbing stones were produced by one concern in Floyd County and one in Orange County, Ohio, and one in Hardin County, Ky. The Kentucky Lithographic Stone Co., at Brandenburg, Meade County, Ky., obtained in the course of its quarry operations material from which it manufactured hones. The major part of the country's production, as reported to the Geological Survey, was oilstones and whetstones from Arkansas, and next in importance were scythestones from Vermont, Ohio, New Hampshire and Michigan. The quantities and values of the several commodities produced in 1917 were as follows: Oilstones and whetstones, 1,225 short tons, valued at $116,910; scythestones, 7,209 gross (weighing approximately 400 short tons), valued at $31,745; rubbing stones, 382,833 pounds, valued at $19,955; hones, 9¼ dozen, valued at $94. The combined quantity was approximately 1,816 short tons. It is to be understood that the quantities and values are for quarry products, which are for the most part subjected to finishing and manufacturing processes and are thereby enhanced in value before being sold to consumers.

Good Granites in Ireland

The trade journal representing the granite workers of Great Britain, in discussing the conditions in the granite industry at Aberdeen and the impossibility of importing Scandinavian granites, makes a plea for the home granites, and tells, especially, what might be obtained in the way of building, monumental and paving stock in Ireland. As it was less than twenty years ago when the tramway "boom" was on, so it is likely to be after the war, when a great demand for granite is certain, numerous individuals and companies will be on the lookout for either new quarries or the opportunity to re-open abandoned quarries, says the writer. For

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those in search of granite suitable for the monumental and architectural trades we venture to suggest that the north of Ireland would not be found a desert. Half-hearted efforts have at intervals been made to place some of the Irish granites on the Aberdeen market, but "the freezing look" has generally been given in place of the expected "glad eye." But that is not to say that the Aberdeen market is closed to the Irish granites, and it is to be hoped that the bad luck, which in many cases would be more suitably termed bad management, which has followed so many ventures in the Green Isle, may not be repeated.

No doubt the variety of colors of the foreign granites have been an attraction. Well, we have seen a few different colors in Ireland, and, at the present time when black granite is so scarce, we know of a monumental yard in the North of Ireland which is turning out some fine monuments in black granite—Irish Black Granite. And the stone is from boulders lying on top of a bed of a few acres of similar rock! Reports to hand say it looks fine. If that place is ever properly worked, when they get down into the rock it should not only look "fine," but excellent.

At Burtonport, in the North of Ireland, a quarry was worked some years ago from which a very good rose red granite was quarried. We saw some large blocks of this granite lying at Newry Harbor some few years ago. They had been there some time, and in all probability are there yet. The nearest approach to Rubislaw, only it was darker, we have seen was a granite from a quarry in County Donegal. Unfortunately for the company who opened the quarry, up to the time they stopped working the place, they had not been able to find it in solid beds.

Less Lime But Higher Prices

The final figures for lime burned and sold in the United States in 1917 are 3,786,364 short tons, valued at $23,807,877, as determined by G. F. Loughlin, United States Geological Survey. This is a small increase over the estimate made in February, which was based on returns received from the principal producers, but it represents a decrease of 7 per cent. from the total for 1916, which was 4,073,433 short tons. In spite of the decrease in quantity there was an increase in value of 28.6 per cent. over that in 1916. Only 595 plants were in operation in 1917 in comparison with 778 in the previous year. The average price per ton, which for a number of years has been within a few cents of $4, rose to $6.29 in 1917.

The quantity of hydrated lime manufactured and sold in 1917 was 709,167 short tons, valued at $4,643,004. In comparison with 717,382 tons in 1916, valued at $3,626,998. This represents a decrease of 1.5 per cent in quantity and an increase of 28 per cent. in value. The average price per ton of hydrated lime was $6.54 in 1917, an increase of $1.48 over the average price of 1916. The hydrated lime sold for use in buildings amounted to 402,223 tons, and that sold for use in agriculture to 177,815 tons, slight decreases from the previous year. There were 90 hydrating plants in operation.

There was a decrease in the quantity used for building and for agriculture, and an increase in that used for fluxing, chemical works, paper mills and tanneries.

Training in Stone Carving and Cutting

The various city companies of London are embarking on an extensive programme of education and are lending hearty support to the Trades Training Schools. The fees at these schools are merely nominal, being on an average $3.75 for the year of three terms, and half fees for apprentices. The complete course in masonry comprises instruction in all the work of a mason in marble, stone, alabaster and lathe work, and each student is taught to draw to scale. In the elementary course the student is taught how to cut up the rough stone, to square it, joint it and bond it into walls. Generally the conversion of stone, methods of cramping, dowelling, the use of straps, bolts and methods of securing stone to modern iron structures, key jointing over wide spaces are taught. In the advanced course the sections of raking and circular mouldings, tracery heads, mouldings and the best way of jointing them, are dealt with, and the turning of balusters. Gothic and Classic work and stone staircases form a part of the subjects treated. The associated companies welcome the attendance of masons in responsible positions who require special instruction, while they are also prepared to grant scholarships to students nominated by the Operative Stone Masons' Society. There are also practical courses in stone modelling and carving, which include drawing as well as modelling, and a life class is provided which students in stone carving are advised to attend.

Slate Flashings for Roofs

The United States Bureau of Standards has given approval to a device by James H. Munro, of Pen Argyl, to replace metal flashings which have hitherto been used in the valleys of slate roofs. The problem of obtaining metal for flashings has long been a cause for worry among government officials in charge of the housing projects. They recognized the importance of using slate for the hundreds of permanent structures, which are being built under their direction, and some weeks ago, when the scarcity of metal became acute, an appeal was made to the slate manufacturers to get together and endeavor to find a substitute that would be in keeping with the wearing qualities of the slate roof. Accordingly, Arch M. Jones, who is representing the Pennsylvania Slate Manufacturers' Association in Washington, and who is in close touch with the government officials, went to the Pennsylvania Slate Belt and explained that unless a substitute was found

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promptly, specifications calling for thousands of squares of slate would be changed to some other roofing material.

This would mean a cessation of the Government contracts, upon which the quarry operators are dependent until industrial and domestic building is resumed, so no time was lost in trying to solve the vitally important problem. Composition substitutes were out of the question, because, it was explained, it would be impracticable to use a flashing that would last five or ten years with a slate roof that would outlast the life of the building. Slate was the only thing that would suit the purpose. To bevel or otherwise cut ordinary roofing slate, which is but three-sixteenths of an inch thick, to fit in a valley was impossible.

Varied experiments along this line helped but little to solve the problem, so the operators decided to lay their troubles before Mr. Munro, of the Inlaid Slate Company, which concern has been a leading factor in the development of flat slate roofs. Mr. Munro quickly grasped the idea as to what was wanted and lost no time in perfecting a device. The basic principles of the flat slate roof were applied and the new device will be manufactured in the plant of the Inlaid Slate Company. Three-ply standard Government roll roofing, similar to that used for roofing the army cantonments, will be surfaced by 3x6 slate, washed, heated to 200 degrees and applied under heavy pressure caused by steel rollers. Under this material will be placed a strong backing of burlap and an asphalt mixture guaranteed not to melt at less than 400 degrees, Fahrenheit. The new flashing will be cut in strips of usual width and a small hinge will provide for adjustment to any angle.

In the manufacture of this new product, only the small "waste" pieces of slate are needed to supply the 3x6 slates, which fact partly accounts for its low cost. Special machinery, also designed by Mr. Munro, is used throughout the process of manufacture.

Canada's Greatest Stone Building

THE largest stone job ever undertaken in the Dominion of Canada is the Union Station in Toronto, now nearing completion. The work has been nearly two years in progress. The exterior is now virtually finished, but considerable remains to be accomplished in the interior finish. It is expected that the building will be ready for occupancy next March. The station is for the Toronto Terminals Railway Company, comprising the Canadian Pacific and Grand Trunk Railway Companies. The plans and specifications were prepared by the Toronto Terminal Architects, of Montreal, an association formed by the firms of Ross & Macdonald and Hugh G. Jones, with John M. Lyle as the Toronto associate. The architects gathered information from the operation of large railway stations in the United States, and made a thorough study of the traffic problem in Toronto. Although a smaller building might have cared for the average and normal passenger traffic, they allowed a full margin for the heavy, maximum periods, such as the annual exhibition time, and the holidays. They designed a massive structure, with the exterior in the style of Roman classic architecture. The wall surfaces are simple and plain, sparing of ornament. But the size of the building and the restraint in the treatment contribute to a remarkably dignified and impressive appearance.

NORTH FACADE OF UNION STATION AT TORONTO, ONT.
Showing the massive columns, forty-one feet in height over all and five feet in diameter, of Indiana limestone

With the exception of a portion of the base, about

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15,000 feet, which is of Queenston stone, from Queenston, Ont., the exterior is entirely of Indiana limestone, furnished by the Indiana Quarries Company, of Bedford, over 200,000 cubic feet of stone being required for the structure. The cut stone work was all done, in record time, by Geo. Oakley & Son, Limited, of Toronto, who were awarded the contract by P. Lyall & Son Construction Company, of Montreal, the general contractors. With the exterior about completed, Messrs. Oakley & Son are now working on the interior, which is to be of Zumbro stone from Minnesota and Tennessee marble.

There are twenty-two massive columns on the exterior, each in three sections. The over all height is 41 feet, and the diameter 5 feet. Each section weighs 20 tons. These columns were turned at the plant of the Central Canada Stone Company, at Point Edward, Can. They are notable as the largest stones ever turned in the Dominion, the rough blocks having weighed about 30 tons.

The illustrations that we present are from recent photographs. One gives a general view of the huge structure, and the other shows the principal façade. Messrs. Oakley & Son have erected many notable buildings throughout the Dominion, but this is their crowning achievement. That they could carry it through without serious interruption in the midst of all the complications of the great war is a remarkable record, and they are entitled to the fullest credit.

Tripoli and Rottenstone

The material called tripoli in the trade in the United States is a white or yellowish, light, porous and generally siliceous rock which has resulted from the leaching of calcareous material from very siliceous limestones or highly calcareous cherts. In origin, properties and some of its uses tripoli is like "rottenstone," which is here classed with it.

Some tripoli from Missouri is and always has been produced primarily for use as an abrasive, but most of it is mined to be worked up into filter blocks of various shapes. The cuttings and waste from making filters are ground and prepared for abrasive and other uses. The Illinois product is generally called "silica" and is used in paint, wood filler, metal polish, in soaps, in cleansers, for making glass, tile and enamel, and for facing foundry molds.

Diatomaceous earth, called also infusorial earth and kieselguhr, is a light earthy material which from some sources is loose and powdery and from others is more or less firmly coherent. It often resembles chalk or clay in its physical properties, but can be distinguished at once from chalk by the fact that it does not effervesce when treated with acids. It is generally white or gray in color, but may be brown or even black when mixed with much organic matter. Diatomaceous earth is made up of remains of minute aquatic plants and is composed, chemically, of hydrous silica. Owing to its porosity it has great absorptive powers and high insulating efficiency and is an effective filter. The hardness, the minute size, and the shape of its grains make it an excellent metal-polishing agent.

Heretofore diatomaceous or infusorial earth has been largely used as an abrasive in the form of polishing powders and scouring soaps, but of late its uses have been considerably extended. Because of its porous nature it has been used in the manufacture of dynamite as a holder of nitroglycerin, but not recently in the United States. It is used by sugar refiners for filtering or clarifying. Its porosity also renders it a non-conductor of heat, and this quality in connection with its lightness has very greatly extended its use as an insulating packing material for safes, steam pipes, boilers and metallurgic apparatus, in making insulating brick, and as a fireproof building material. In this country it is used in the manufacture of records for talking machines.

Rottenstone is a porous, generally loosely coherent product of the weathering and leaching of siliceous limestones. It is produced at only one locality in the United States, at Antes Fort, Lycoming County, Pa., by the Penn Keystone Co., of Williamsport, Pa. It is used chiefly as polishing and scouring material. The total production of these materials in this country last year was valued at $123,784.

What Limestone is Worth on the Soil

A ton of ground limestone is worth approximately $8, as determined by the crop increase which it will bring when applied to the average soil in Missouri. This figure has been secured by averaging the returns from lime on the various soil experiment fields of the University of Missouri College of Agriculture when crops are figured at present values. The cost of a ton of ground limestone at the crusher varies from $1 to $1.50. The freight rate over a single road for 100 miles is 60 cents, and the cost of hauling two or three miles and spreading on the land is around $1.50 per ton. The total cost, therefore, of limestone spread on the land in most parts of Missouri will vary from $3 to $3.50 per ton. This means that liming will return 200 to 300 per cent. on the investment on lands which need it. M. F. Miller, of the College of Agriculture, suggests that Missouri farmers handling sour lands should consider liming as a war measure.

Florence's Trade in Marble and Alabaster

According to consular reports from Florence, Italy, the exports of luxuries, such as alabaster and worked marbles, have steadily decreased since the beginning of the war. These goods are made in France, and the falling off in trade in these and like luxuries has seriously affected the prosperity of the city. The exports of alabaster in 1916 amounted to $52,388, and in 1917 to only $32,231. The exports of worked marbles were $84,715 in 1916 and $46,023 in 1917.

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Labor Saving in Limestone Quarrying

By OLIVER BOWLES

THE participation of the United States in the present world conflict has led the Bureau of Mines to concentrate its activities on such phases of the mining and quarrying industries as will best promote the nation's military effectiveness. The labor situation is becoming more and more acute, and this pamphlet is designed to assist in some measure in relieving the labor shortage in those branches of the limestone quarrying industry that are indispensable to the military programme.

The nation's normal industries have suffered considerably on account of labor shortage occasioned by the mobilization of men to form a great army and navy, and by the development of special industries to supply their needs. The quarry industries are no exception to this rule, for many men, both skilled and unskilled, have been taken from these industries by enlistment or by the selective draft. In addition to losses through ordinary enlistments, the formation of a regiment (the 28th Engineers) consisting entirely of skilled quarrymen has further reduced the available labor supply in this most necessary class of quarry workmen.

The unprecedented demand for iron and steel occasioned by the war has developed maximum activity in the iron smelters of the United States. As a limestone flux is required for smelting siliceous iron ores, quarrying for the production of blast-furnace flux is an industry essential to successful prosecution of the war. The heavy demand for fluxing limestone combined with an increasing difficulty in obtaining sufficient quarry labor, has resulted in a condition that demands relief. Hence, the time is opportune for the Bureau of Mines to disseminate whatever information it may possess that will in any way assist quarrymen in their efforts to produce a maximum of rock with a minimum of labor. The purpose of this pamphlet is, therefore, to direct the attention of quarrymen to the most successful and efficient labor-saving methods and machines. Although many such devices are now in successful operation, there are few companies that cannot in some way modify their methods or equipment so as to conserve labor.

The author has visited a number of fluxing-limestone quarries for the express purpose of observing labor-saving devices, and, in conncetion with various quarry studies during the past four years, has obtained information relating to this subject. Consideration is given only to those methods and types of equipment that have been tried and approved by quarry operators.

The demand for labor in limestone quarries has in past years been adequately met in most localities, especially in the Southern States. In fact, labor has in many instances been more readily obtainable than capital. This condition is reflected in the quarry equipment, for where capital has been more difficult to obtain than labor the tendency has been to employ only

NEW UNION STATION AT TORONTO, ONT.

Built of Indiana Limestone and the Largest Stone Job Ever Undertaken in the Dominion of Canada—Only Two Years in Building

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the most necessary mechanical equipment, and wherever possible to conduct operations by simple hand methods.

The tendency to employ hand labor rather than machines has, however, certain disadvantages, and of late years, especially in large quarries, hand methods have been largely superseded by mechanical means. This substitution of method was occasioned in most cases not by any pronounced shortage of labor, but because the mechanical methods were quicker, cheaper and promoted a rapid and material increase in production.

When labor is cheap and plentiful the advantages of mechanical equipment, particularly in small quarries, are questioned by many operators. In large quarries the advantages of mechanical equipment are generally recognized. The adoption of such equipment has, however, been slow in many places. This is due to various causes, the chief of which are conservatism of operators, lack of information on modern equipment and lack of capital.

While it is a difficult matter to properly judge the relative military importance of various industries, it is comparatively easy to select certain industries that contribute definitely and materially to the nation's military strength. Various branches of the limestone quarrying industry fall in the latter class. Many quarries produce stone for concrete aggregate, for cement or lime, or for road material, all of which are more or less directly concerned in the military programme.

There is one branch of quarrying, however, that is directly associated with an industry of vast military importance. The heavy demand for iron and steel occasioned by the war has kept the iron smelters of the United States employed at maximum capacity. The increased activity in smelting is reflected in a corresponding increase in the demand for fluxing limestone. According to statistics compiled by the United States Geological Survey, the production of blast-furnace flux in the United States during 1916 amounted to 23,603,508 tons, valued at $13, 936,882, an increase of 24 per cent. in volume and 44 per cent. in value over that for 1915, and the increase during 1917 has evidently continued at about the same rate. During August, 1918, the statement was made in a technical journal that the production of fluxing limestone had then reached 120,000 tons daily. The increased demand for flux is occasioned partly by the increase in iron production and partly by a wider use of siliceous ores that require a high proportion of flux. As adequate supply of fluxing limestone is absolutely necessary in iron smelting, limestone quarrying ranks among the most essential industries.

It is obvious that for industries of such importance every precaution should be taken to insure requisite activity. A pronounced shortage of limestone would paralyze the iron-smelting industry no less surely than a shortage of fuel or of ore. It is wise, therefore, in this critical period to consider carefully any circumstances that may tend to materially curtail production, and to take whatever steps may seem advisable to overcome all obstacles.

During 1917 and 1918, a new factor has made its influence felt in all the industries of the nation. The creation of a great army and navy, the development of industries to supply them with food, clothing, munitions and equipment, the necessity for supplying our allies with war material, and the building of an immense merchant fleet, have combined to greatly increase the demands upon the labor supply of the country, and the situation will probably become more and more acute as the military strength of the country develops. It is apparent, therefore, that labor shortage is one of the serious problems if not the most serious problem that confronts limestone-quarry operators at the present time.

The demand for a greatly increased production of fluxing limestone, combined with a labor shortage, creates an acute situation that demands relief. One obvious means of relief is to substitute mechanical equipment for labor. Fortunately, many such substitutes are not only known but have passed the experimental stage, and are now in successful operation in many places. Labor may also be conserved by simplification of method, by efficient blasting, and in various other ways.

Labor-saving devices include all quarry equipment and quarry methods the employment of which tends to reduce the labor required for a given output. Such saving of labor is accomplished by mechanical devices performing work formerly done with hand tools, by equipment that simplifies quarry methods and eliminates all unnecessary operations, by methods or plans that utilize all natural conditions to best advantage, or by such conduct of quarry work that time may not be wasted in idleness or in unprofitable employment.

Many labor-saving devices are in the form of mechanical equipment. It has commonly been found that machines controlled by a few men can do as much work as a large number of men can perform when unassisted by machines.

Other labor-saving devices consist in the use of simple and direct quarry methods. Quarry operations should be planned so as to avoid all methods that place an unnecessary burden on labor. Thus excessive rehandling of material, complexity in transportation systems and loss of time through conflict of various operations should be avoided. Where this can be accomplished by modification of method, involving no heavy expense in the purchase of new equipment it is a type of labor saving that demands special encouragement.

Objections to the purchase of new mechanical equipment at this time are: The shortage of supply owing to the demand on machine shops to manufacture war material, the heavy demand for iron and steel, and the high cost of machinery. Many operators, however, are fully convinced that certain types of quarry ma-

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chinery offer sufficient advantages to encourage their purchase even under present unfavorable conditions.

Having pointed out the need of labor-saving devices imposed upon quarrymen by the extraordinary conditions of the war, the following pages are devoted to a consideration of specific types of equipment that save labor, and to a discussion of quarry conditions and methods that favor economy of labor.

Many of the methods and types of equipment discussed in the following pages are applicable only to quarries of considerable size; for operators having limited capital would scarcely be justified in purchasing expensive equipment. However, a small and simplified modification of the more elaborate equipment designed for large quarries could probably be substituted to advantage for hand methods in many small quarries.

The method of opening a quarry may have a direct bearing on the economy of labor in developing it. The depth of stripping to be removed should be carefully noted and an effort made to develop the quarry in a direction that requires a minimum of stripping.

All rock structures should be carefully considered, for their presence may greatly influence the ease of rock removal. In one New York locality, for example, the limestone beds dip about 4 degrees, and the quarry was opened in such a manner that development took place down the dip. As a consequence, accumulations of water at the working face after every heavy rain caused a temporary suspension of operations with consequent loss of labor. Had the quarry been opened in such a manner that development proceeded in the opposite direction, the water would have drained away, and no accumulation at the face would have been possible.

Planning a quarry so as to utilize rock structures to best advantage may greatly economize labor. Where limestone lies in approximately horizontal beds the utilization of an open bed plane for the quarry floor, or a bench floor, not only makes blasting easier, but the smooth surface that results requires little or no grading or ballast for tracks, and track laying may be accomplished with minimum labor. A smooth floor also facilitates rock loading.

The quarry, crusher and storage bin should be so situated that transportation may be simple and direct, and the force of gravity should be utilized wherever possible. This matter is considered in greater detail under the heading "Transportation."

Limestone quarried for blast-furnace flux must be as free as possible from siliceous impurities. Commonly the permissible silica content is limited to two per cent. As large a proportion as possible of the quarry overburden, consisting of clay, sand, gravel, bowlders, or mixtures of these materials, all containing a large percentage of silica must, therefore, be separated from the rock.

The removal of overburden is accomplished in many different ways, the variations in method depending greatly on quarry conditions. The amount of overburden to be removed may vary from a few inches to 25 or 30 feet. Obviously methods employed for the removal of a few inches of foreign material would not be applicable for the removal of a depth of several feet. Stripping methods are influenced by the nature and depth of the overburden, and also by the nature of the rock surface, by the convenience of the dumping ground, by water supply and drainage, and by the amount of capital available for stripping equipment.

Operators of quarries in rock deposits with overburden limited to a few inches in thickness may be justified in shooting down the overburden with the rock, and in separating rock and waste material by a subsequent operation. Where seams or erosion cavities are filled with clay, sand or gravel, the difficulty of removing the waste material before rock blasting may render it necessary to blast rock and waste material down together, and to separate the siliceous material from the good limestone at a later time. Such subsequent separation may be accomplished by either of two methods.

According to the first method the rock fragments are loaded into cars by hand, and accumulations of debris are loaded in the same way. For small quarries such procedure may be justified, but under conditions of labor shortage the method is too slow and laborious to be recommended for quarries of any considerable size.

The second method is in common use in the larger quarries. The rock fragments together with waste material are loaded with a steam shovel, a method that is economical of labor, and the separation of good rock and waste is accomplished by screening or by washing in conjunction with screening. From the standpoint of labor saving, this method is greatly to be preferred. One objection to the method is the waste that results from the finer rock fragments passing through the screens with the debris, although this waste may be partly overcome by screening the rock to various sizes and discarding only the finest grade of material.

While shooting down rock and overburden together, and subsequently separating them by sorting, screening or washing, may, as stated above, be justified under certain circumstances, the removal of overburden prior to rock blasting offers certain definite advantages.

In their natural occurrence serviceable rock and waste material are as a rule distinct, and are separated by a well-defined boundary. An exception to this rule is the occurrence of clay seams or pockets in the rock ledge. Where any considerable amount of debris is originally unmixed with the rock, it is obviously a poor policy to mix rock and waste by blasting them down together when their subsequent separation is demanded. It involves unnecessary handling of waste, and in rainy seasons the presence of sticky clay with rock impedes operations and renders separation difficult. A better plan is to remove overburden as completely as possible before blasting the rock ledge.

(To be continued)

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STONE

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THE tremendous work we are doing to uphold our part in the war has made unprecedented demands on the steel and iron industry. This, in turn, calls for a larger output of limestone for fluxing purposes than our quarries have furnished in all their history. But with the quarries, as with all other industries, the labor shortage at this time is most acute. The National Government has therefore turned its attention to this problem. The Bureau of Mines assigned one of its best-qualified experts, Mr. Oliver Bowles, to study "Labor Saving in Limestone Quarrying." Mr. Bowles is no mere closet theorist, but a thoroughly practical and experienced quarrying engineer. During the past few years he has written several hand-books treating of various phases of quarrying, and these are familiar to readers of this magazine. Owing to the great importance of the subject at this time, and the pressing need to keep our limestone production at the maximum, no excuse is needed for presenting Mr. Bowles' advice and suggestions in full. His pamphlet will shortly appear, but advance sheets have been placed at our disposal very kindly by the Bureau of Mines. We must give the world the measure of our ability to meet emergencies in quarrying as well as in every other line of activity.

EVERY thoughtful person recognizes that with the coming of peace the problems that will confront the industries of this country will be just as vital and far-reaching as those that we met when we entered the war. There must be reconstruction and readjustment all round. One of our national weaknesses is that we are opportunists, and do not prepare ourselves for future complications with the thoroughness of the Germans, for instance. It is promising that there is now a general movement of preparation for reconstruction after the war. In the last week of November the League of American Municipalities will hold a conference to determine what the municipalities can do. The War Service Editorial Conference of the trade, class and technical press of Chicago has called a conference of trade editors of America to be held in Chicago, December 5 and 6. The main object of this gathering will be to perfect some kind of national organization to the end that when a preparedness platform is adopted, agitation may be continued along proper and effective lines. Some of the most important problems that must be studied are the re-establishment of credits, the systematic redistribution of labor into natural channels, the re-adjustment of prices, the determination of the production programme by industries to show, if possible, where curtailments will be necessary and where acceleration is inevitable, and to re-establish market relations generally. Few lines of business have been affected to a greater degree by the war than the quarrying and cutting of stone. The general resumption of building activity cannot much longer be delayed. The spirit of co-operation that has been brought about by the war service committees cannot but have a good effect. What is most needed after peace comes is that there should be a better understanding than heretofore between all the different branches of the industry so that there may be united and entirely harmonious efforts to put natural stone in the place to which it is fully entitled, as the choicest and most deserving of all materials of construction.

The Embargo on Building Lifted

As this magazine goes to press, an armistice has been signed by the embattled nations of the world. There can be scarcely a doubt that an enduring peace will soon be concluded, so that this country and the war-worn lands across the sea can begin the great work of reconstruction. That we shall immediately respond to the changed conditions is certain. Already the government at Washington has made the announcement that the embargo on building has been raised and that construction work can go ahead with only such local restrictions as may be necessary.

The shortage of buildings, for public, business and residence purposes, has been more marked during the past year or two than ever before in our history. We must undertake, in as short a time as may be possible, a stupendous building programme. Courthouses, post-offices, schools, churches, banks, factories, commercial buildings and dwellings are imperatively needed throughout the length and breadth of the land. Plans were perfected for many of these months ago, but construction work had to be held in abeyance to await the outcome of the war. The problem of financing the building work may be puzzling at first, although funds are available for much that can be started at once. For instance, the New York Board of Education has approved plans for new construction of school buildings involving an expenditure of approximately $9,-

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000,000. Inasmuch as thousands of school children are without accommodations in this city, the work must be pushed forward without delay. Like conditions are to be found everywhere.

The stone industry has been grievously hit by the war, operations having been almost completely suspended in some of the leading quarrying centers. Now there will shortly come such a revival of activity as has never before been witnessed. The quarries are in condition to respond to any demand that may be made upon them, once the vexed problems of labor, fuel and transportation are settled.

Helps for Designers and Craftsmen

An excellent indication of the march of events in these hectic days of grim struggle for the mastery of an ideal in human life is the spirit of usefulness demonstrated by the Metropolitan Museum of Art, an institution devoted to the maintenance of the arts of peace and now doubly anxious that these arts be improved and propagated for the time after the new day has dawned when our readjusted existence and our millions of returned fighters will require that balance wheel of grace and beauty which a fine environment affords. By those who have not considered the matter with adequate care, it may be thought that museums of art are among those so-called non-essential factors of a quiet life, suddenly made unnecessary when men's minds temporarily turn to military methods of solving their problems. The museums, however, have shown that the German point of view of peace as only the interval between wars requires complete inversion to apply to American life and thought. War is the infrequent ugly interloper, a destroyer whose reappearance for many centuries the concluding peace of the present conflict will make impossible. Believing that the era of progress, which this war will certainly usher into the world, will see an exceptional development in the various industrial arts branches, we are glad to record the step taken by the Metropolitan Museum in the salutary direction of affording an immediate co-operation and assistance to manufacturers of decorative art objects, from furniture and textiles to garments and jewelry. The Museum has established a department devoted specifically to the requirements of producers and dealers in industrial art objects, a department which will make every effort to render accessible the invaluable resources of the collections for the betterment of American design and craftsmanship. This office will be in charge of Richard F. Bach, of Columbia University, formerly one of the editors of *Good Furniture Magazine*. Mr. Bach's experience in the field and especially his knowledge of the nature of the design problems related to the requirements of manufacture and merchandizing will make it possible for manufacturers to obtain direct assistance, so that they may henceforth rest assured that there are no unmined treasures in the splendid Morgan and other collections to which they have not immediate access in terms of their own particular problems and requirements. It is planned to make this departure on the part of the Museum directly useful to all designers and producers, dealers and manual craftsmen engaged in any way in connection with the making or selling of furniture, fabrics, floor coverings, clothing, metal work, woodwork, jewelry, laces and any other industrial art branches.

Those of us who have followed the development of the Metropolitan Museum of Art since its inception, or even during the last twenty years of its phenomenal growth will see in this announcement one of the most important forward strides that could be taken in American industrial arts production. We all recall the emergence of the public library from its fossil age of fifty years ago when it was a "collection of books." Today the library is one of the busiest centers of any village or city, a nucleus of information of inestimable value. So it is with the museums of the country. They, too, have gradually emancipated themselves from the earlier state of slavery to the unmitigated instinct of the collector. Nor is this an aspersion upon the public-spirited men who first saw their way clear to establish such collections. The collector's instinct is and must be at the base of all such undertakings, museums and libraries alike, for without it the fundamental impulse that brings them into being would be lacking. But the institution once established, it no longer suffices for it to keep on its smooth course of gathering and exhibiting, believing that people are bound to come. The inertia of the human mind is too serious an obstacle to this course. Like the library, the museum has found that the collecting instinct unimproved in accordance with the needs of the time comes to resemble a hoarding instinct, and that to be a collection of objects ceases to be the real aim. Thus the service ideal presently takes its place beside that of the collector's original intention and the museum objects are rendered useful by a thousand and one channels of real development in the factories and studios and salesrooms. This service ideal is given a real value in view of the gigantic struggle in France, from which so much of our inspiration in this very field has regularly come, and therefore we are especially pleased to note that the Metropolitan Museum of Art has once more taken the leadership for the greater good of the community.

THERE will be general interest throughout the stone trade of the entire country in the decision of the court just made in the case of the contract for the Free Library Building at Philadelphia. That city had adopted an ordinance requiring that all stone entering into any municipal work must be cut and prepared in the city. The contractor who was to erect the library building proposed to cut the stone at the quarry, but he was estopped by a taxpayer's suit. The case has been before the courts for more than a year. There have

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been full hearings, eminent Philadelphia attorneys representing both sides to the controversy. The court has now decided that this restrictive ordinance is null and void, the order being printed in full in another column. No matter how this may affect local interests, there is little doubt that it will prove of benefit to the stone trade at large. Various substitutes for stone have made their way on the plea of cheapness and restrictions that tend to increase the cost of stonework will have a tendency to induce builders to use other materials. When one takes into account durability, dignity, beauty, fitness and upkeep, stone would naturally be chosen for every important structure, but unfortunately first cost often has too great weight. For this reason statutory restrictions are apt to defeat their own purpose.

Chinese Stone Cutters

Although the Chinese build largely with wood, they have for untold centuries carved and dressed stone, both for purposes of construction and decoration. It is true that their finer carvings are almost invariably in ivory or wood, but still stone plays its part, in

LEISURELY STONE-CUTTING IN CHINA

statuary and in certain forms of trim. Owing to the marvelous cheapness of labor, time does not constitute much of a factor in stone working. The Chinese stone cutter works with small chisels and light mallets. He does not use sledges and bull-sets, but he pecks away at the stone, taking off minute chips, and giving a fine finish with the tool. The accompanying picture gives an interesting view of a stone cutter at his task. The photograph was taken by Mr. Daniel J. Torrance, of the Stone & Webster organization. Mr. Torrance was a member of the American International Corporation, which, in 1916, entered into an arrangement with the government of China which involved, among other things, the improvement of the Grand Canal.

Rich Stonework in a New Irish Church

The new church of St. Patrick, at Newport, County Mayo, Ireland, has been designed by Mr. R. M. Butler, Dublin, on lines suggested by the Irish Romanesque, and is built of Irish and local materials, within and without, as far as possible. The exterior has been erected of a splendid local red sandstone, so hard that it was impossible to carve or dress it into the forms or details of the new style, and hence granite from the Dublin mountains and limestone from Cork were utilized for such wrought work as parapet copings, crosses, finials, etc. The parapet walls over the aisles are built of a checker pattern, formed of red sandstone alternating with a cream-colored stone from near Balla. Ireland is rich in deposits of fine stone, but few quarries have been developed, mainly from lack of adequate means of transportation.

Fighting Over the Colorado-Yule Properties

Mention was made in these columns last month of the new complications involving the properties of the Colorado-Yule Marble Company, in Gunnison County, Col. The company, which was forced into a receivership in Judge Mullins' court at Denver two years ago, is attempting to effect a reorganization. In the meantime, the commissioners of Gunnison County ordered it sold for taxes, which are overdue for the years 1913, 1915, 1916 and 1917. A bid received from A. H. Radetsky, a dealer in second-hand materials at Denver, was accepted, in which Mr. Radetsky agreed to pay $25,000 to cover taxes for 1916 and 1917, receiving a treasurer's deed for $8,000, which would be left to apply on the taxes for 1913.

A new factor in the fight over the disposition of the property entered the case the past month when Ben Grimes filed with the District Court a petition for a restraining order against Radetsky, the county commissioners and treasurer of Gunnison County.

In his complaint Grimes alleges that Radetsky is not alone in the deal to purchase the holdings of the Colorado-Yule Marble Company for taxes. An agreement is in force, he declares, by which Radetsky was to make the purchase in their joint names, each to put up half of the funds and to share alike in the profits.

Sensing large profits in the Gunnison County deal, according to the petition, Radetsky made a contract with the county commissioners in his own name and intends to crowd Grimes out of it. On this account an order restraining Radetsky from going on with his injunction suit against the commissoiners, because of their refusal to carry through the deal, is asked, pending an adjustment of the partnership arrangement.

Upon hearing of the action of the county commissioners, Judge Mullins took a hurried trip to the scene and, representing the receiver, declared that the contract with Radetsky should be set aside. He laid a substitute offer from the Colorado National Bank before the commissioners, amounting to $38,000, which will serve to protect the property by keeping it up and paying taxes during the war.

If the Radetsky contract is sustained, the property will be dismantled. Its value, considered as junk alone,

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is more than half a million dollars, according to Judge Mullins. "The copper wire alone is worth easily $25,000," he stated. "The plant is in perfect working condition—it could be started up tomorrow by the pressing of a button. Here are miles of railroad track, turbine engines and a modern town, with paved streets and houses—all of which will go to Radetsky for $8,000 unless the commissioners rescind their action, as I think they will do."

The value of the plant under operating conditions, with the immense marble resources available, is estimated at $2,500,000. It cannot, however, be operated during the war, since the Government has classed it as a non-essential industry and has shut off its fuel supply.

Building During the War

The curtailment of building during the war is not a saving, but an expense because, through lack of facilities, the cost of everything is increased, since buildings are tools of industry, necessary for the production of all other tools of industry in addition to the necessities of life, food, clothing and shelter, says the *Contract Record* of Toronto.

Buildings are a source of production; they create rather than exhaust capital. There is no use to which raw materials can be put that will create more. Buildings are a permanent form of wealth and produce more wealth. Money tied up in idle land is dead; put a building on it and it becomes alive and an earning power. By curtailing the consumption of food, clothing or luxuries, we add to the wealth of the country; by curtailing building we lose. If expansion to your plant is necessary, don't postpone it until after the war in anticipation of lower cost. We must be prepared for the commercial campaign that will, logically, follow the war. Lord Roberts preached preparedness for years, but very little attention was paid to his efforts. What did this lack of preparation cost us in British blood and in length of duration of the war?

There is little doubt that America will be called upon to supply industrial necessities to Europe. The warring nations in Europe have more or less exhausted themselves in the titanic struggle and they will be, to a great extent, dependent on this country. If we are not prepared to compete at the very outset, our big opportunity is gone. If the essential industries are hampered by lack of space now, what will be their chance of engaging in competition with organizations that have been far-seeing enough to prepare for the extra load likely to be placed upon them? Build now and be ready to produce at the first call.

There seems to be little prospect of a reduction in building cost for many years after the war; in fact, costs may be even higher than they are to-day. Costs are based primarily on cost of labor, and it is a well-known fact that when wages have been raised, it is a most difficult thing to reduce them to the old standard.

Those interested in construction generally begin to realize that the days of low cost—if they ever come again—are in the distant future. The war has caused a huge increase in all building materials. The decrease in men through losses in the war, the rebuilding of devastated France and Belgium, and the consequent demand for labor, means that under the law of supply and demand, labor is going to be high for a long time to come. Material costs will also remain high for the same reason.

It would appear that an unprecedented era of general industrial activity is in prospect for Canada at the conclusion of the war, if Canada is in a position to deliver. Don't let us fall down—don't let Canada fall down. Let us be in a position to compete with our neighbors and allies as well as with our enemies.

Unusual Features in a Mausoleum

The mausoleum illustrated herewith was designed by Dodge & Morrison, of New York, for Mr. Benjamin L. Stowe, of the Eureka Fire Hose Mfg. Company, long a resident of Greenville and prominent in civil matters in Jersey City for many years. He was a trustee of the Jersey City Free Public Libraries and is now president of the Hudson County Parental School

MAUSOLEUM RECENTLY COMPLETED IN JERSEY CITY

Board. The mausoleum has just been completed in a Jersey City cemetery, the entire contract having been awarded to Dickson Brothers, of Jersey City.

Mr. Stowe was very anxious to construct the mausoleum true to type and strictly in accordance with the Doric order of Grecian architecture, even to the minutest members of the mouldings. The front pilasters extend beyond the screen wall and are on a line with the Doric columns which stand isolated between

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them, supporting the entablature, thus forming a vestibule. Each side and rear wall is all in one stone, the rear wall having an opening cut through the solid stone for the stained glass window. The architrave and frieze, including triglyphs, are in one solid piece on each of the four sides of the building. The roof, including mutiles and cornice mouldings, are in three separate stones, approximately 21 feet in length over all.

The exterior is of Barre granite, and the floor within is of one highly polished granite slab. The rest of the interior, including the casings of the eight catacombs and the walls and ceiling, is finished in imported Italian marble.

Want to Save a State Asset

The complications over the property of the Colorado-Yule Marble Company are told in another column. Commenting upon this state of affairs, the Denver *News* says: "Are we going to sit idly by and permit the ruin of the Colorado-Yule marble property? Are we going to permit the junking of Colorado's greatest building asset for a song, during war time? Rather should we join openly, as a public-spirited act to save the property for the state; and we write the words advisedly, 'for the state.' It is a state issue, a public question, a matter for public-spirited citizens to take in hand. In the world of architecture, Yule marble has given Colorado a series of advertising such as it has never received from any of its products. This quarry stands equal with the famous marbles of the Old World that are household words. Beautiful buildings have been constructed of the Colorado marble; historic structures stand out finished with the Colorado stone, monuments have been erected from it, preferred in competition with the world's best. The Yule quarries were just beginning to be properly developed when they were closed by a combination of circumstances. Thev were becoming known in the art world as the finest in all the land. And now the machinery is to be scrapped, junked by professional junkmen, the property to be abandoned and go to waste."

Government Takes Over a Quarry

Anticipating a busy winter at the Government Depot, Jeffersonville, Ky., Col. Robert B. Powers, depot quartermaster, is having many miles of roads built. Recently the Government took over the quarry of the South Construction Company, near Belknap. A large force of men is employed there. To further increase the output a contract has been made with William Bruner, of Utica, Ky., to get out rock from the farm of Edward Hlatt, where a crusher has been installed.

Licenses for Gypsum Revoked

The War Trade Board announces, in a new ruling, that all outstanding licenses for the importation of gypsum from overseas, except such as may be carried upon sailing vessels or by the barges allocated for that purpose, have been revoked as to ocean shipments on and after June 11, 1918.

No licenses for the importation of plaster rock or gypsum from overseas will hereafter be issued except for such shipments as may be carried upon sailing vessels or upon barges so designated.

Personal

N. Serracino has removed his architectural office to 507 Fifth Avenue, New York. Mr. Serracino graduated in civil engineering from the Royal University of Naples, and announces that in addition to the execution of architectural work he will also enter the field of engineering.

Building Activities in Copenhagen

High house rents have affected the price of lots in the vicinity of Copenhagen, and one farm after another is being divided out and sold for building lots, according to Commercial Attaché Erwin W. Thompson, Copenhagen, Denmark. As an illustration of the increased prices, the villa and gardens of "Ordruphoj," which some years ago cost $150,000, now cannot be bought for $200,000. A farm of 70 acres has been sold for $55,000. On a small part of a neighboring farm 17 modern villas are at present being built, estimated to cost more than $300,000. A number of smaller houses are also being built and high rents are charged for them. Local investors are wondering whether it will be possible to maintain the high rents which would pay interest on the invested capital after the war.

Invited to Inspect Granite Quarries

If you were a Board of Freeholders and had planned a nice autumn trip to Maine at the expense of a granite company under the pretense of "inspecting" a quarry and some talkative person spoiled the party by telling everybody about it, wouldn't it make you mad? asks the Jersey City *Journal*. This was the situation in which the Freeholders found themselves. All plans had been laid for one of the most elaborate official "junkets" on record. The boys were going to have the time of their lives. But somebody told tales out of school. Election Day is not far away, and the Board, fearful of creating any issues for the independent ticket, was obliged to postpone the excursion for several weeks.

Relaxation of French Embargo on Marble

According to a cablegram of October 14 from American Consul General Thackara, the French Minister of Finance issued a decree on October 7 permitting the exportation and reexportation without special authorization of rough-sawn marble intended for England, uninvaded portions of Belgium, Italy and countries outside of Europe.

Limestone and Sandstone

Additional machinery installed at the quarries of the Bessemer Limestone Company, at Hillsville, Pa., involving an expenditure of about $40,000, is now in operation. The improved facilities include washing apparatus, which will also sort the limestone. The improvements will enable the company to increase its output of both stone and agricultural limestone. The new machinery sorts out the smaller sized stone, which is separated and may be used for road building purposes and the like. At present the Bessemer Limestone

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Company is producing stone of all kinds at the rate of about 70,000 tons a month, and employs 250 men. Its production is steadily increasing and it is estimated the output this year will approximate 650,000 tons. Business in the agricultural limestone department has more than doubled in the past year. The greatest output of stone of all kinds by the Bessemer company in any one year was 600,000 tons.

H. M. Grenell, who has been in charge of the quarry interests at Sandstone, Minn., for several years, has left for his home in Minneapolis.

Government Work

The Navy Department will erect five storage buildings at Yorktown, Va., to cost about $750,000.

The Navy Department will build an extension to the naval training camp at Great Lakes, Ill., at a cost of about $400,000.

The United States Housing Corporation, Washington, is planning the erection of 1,000 houses at Dayton. F. H. Michaelis is manager in charge of the project.

Moss, Taylor & Crawford, Girard and Fifty-eighth Streets, Philadelphia, have been awarded the contract for the erection of houses and dormitories on B and Twenty-third Streets, Washington. In addition to ten houses in units, there will be 336 apartments.

The War Deparment will build a $1,000,000 emergency hospital at Washington and will spend $200,000 on hospital buildings at Rochester, N. Y., and $250,000 at Westchester, N. Y.

The Navy Department will spend about $45,000 in building a sea wall at the torpedo station, Newport, R. I.

The Navy Department has awarded contracts for installing air compressors in various navy yards to the Ingersoll-Rand Company, 11 Broadway, New York, for $121,010 and to the Sullivan Machine Company, 122 South Michigan Avenue, Chicago, for $17,322.

Close-Mitering Slates

There are three methods of close-mitering hips with slates —(1) By means of lead soakers as shown in Fig. 1; (2) by means of a V-shaped gutter of lead at the joining of the boards, as shown in Fig. 2; (3) with a lead dressed over a ridge bottle, dressed 2 in. on each side of the roof and beaded over.

A writer in the *Building World*, of London, says that he cannot from experience advocate the efficiency of any of these systems, but nevertheless believes that, with careful workmanship, and due regard to the slates to be used, and to the situation of the building, the method shown by Fig. 1 may give a water-tight roof. In this method an ordinary slater's lath is nailed on edge up the hip; and as each course of slates is put on, pieces of lead, as shown by the black square in Fig. 1, are nailed on at the hip. These vary with the size of the slates.

The part of the soaker which is to cover the slate in the corresponding course on the other side is dressed up against the edge of the lath, and left that way until that side of the roof is finished. When the lath has been taken away, the other side is slated and mitred to the slates already on, the lead being dressed down under the slates. By this method, a straight mitre is shown up the piend or hip.

Another way of doing this is to carry up all the sides of the roof at one time (if it is a pavilion or lean-to roof, with hips) by nailing on and tightening lines up the hips, the slates being mitred to the lines.

Regarding the method shown by Fig. 2, nothing can be said in its favor. The joiner cuts out the V gutter A down the hip at the joining of the boards, the plumber dresses the lead into it, leaving 2 in. of the bead dressed on the boards, with a bead turned over all the way down the hip. The slater nails up a line and mitres his slates half over the V gutter.

In a third method, a ridge bottle is fixed up the hip, and the lead is dressed over the bottle and on to the roof 3 in. and beaded over. The slates are then mitred close to the bottle. Yet another method which I have frequently seen adopted is that of simply mitering the slates, and bedding them in cement.

Of the methods here described, the first is the best; the lead soakers being on top of the slates, help to bind them

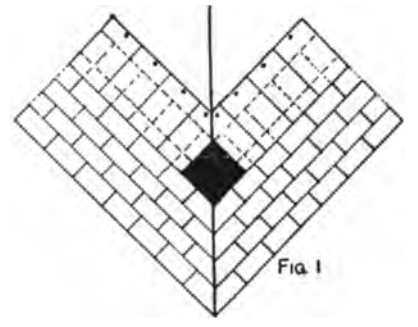

FIG. 1

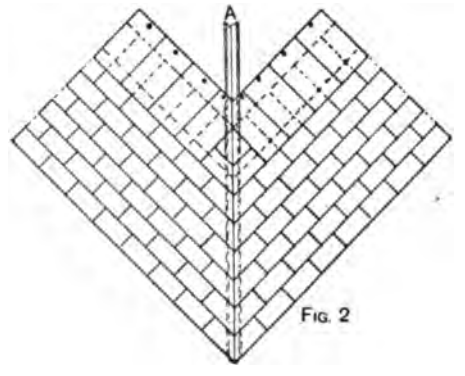

FIG. 2

down. Nothing can be said in favor of the other two methods. Dust and dirt getting into the gutter through the mitres of the slates eventually choke them, causing the water to run over the bead on to the ceiling below.

Close-mitering slates is an expensive method. On no account should this work be specified for stormy positions; and care should be taken to select slates that are suitable for the work, as all kinds are not adapted to it.

Construction Notes

The Union Bank of Canada, with headquarters at Winnipeg, is planning to rebuild its branch building at Abbey, Sask.

The Canadian Bank of Commerce, Toronto, is contemplating the erection of a branch building at Drumheller, Alta.

The Merchants' Bank of Canada, Montreal, has completed the foundations for a branch building at Heisler, Alta.

Allen & Grant, of St. Boniface, Man., have the contract for the cut stone work in the new building for the Canadian Bank of Commerce at Vermilion, Alta., and also for the branch building of the same bank at Virdin, Man. Both buildings will use Tyndall stone for trimmings.

R. A. Schuman, Trenton, N. J., is preparing plans for a new structure for Holy Trinity Church, at Bridgeport, Conn. The church will cost about $80,000.

The contract for erecting the 6-story banking and office building for the Jefferson County National Bank, at Watertown, N. Y., has been awarded to H. T. Wright, 128 Sterling Street, Watertown.

The Ross-Meagher Company, Ottawa, Can., has been awarded the contract by the Provincial Government for the

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erection of barracks at Toronto. The work will cost about $327,000.

The Department of Public Works, Edmonton, is planning the erection of a $400,000 hospital at Bowers, Alta.

Edwards & Sayward, Candler Building, Atlanta, have prepared plans for a $100,000 3-story dormitory for Winthrop College, at Rock Hill, S. C.

The Canadian Steel Corporation is planning a $500,000 housing development at Ojibway, Ont.

The lowest bid for the erection of a fire house and police station, at Kearney, N. J., was from J. T. Boyle, Newark, at $73,654.

Thompsonville, Conn., will build a $65,000 school.

The University of Texas is planning to convert its theological seminary into a military hospital at a cost of $100,000.

The New York Catholic War Fund will build a base hospital on Tremont Avenue, New York, after plans by Scott & Prescott, 1 Madison Avenue, New York. The work will cost in the neighborhood of $250,000.

The contract for the erection of the new high school at South Haven, Kan., has been awarded to the Witchita, Kan., Construction Company.

The Essex County Freeholders will soon receive bids for the erection of a sanatorium at Verona, N. J., to cost about $119,000.

Lambert Bassindale, Capital Bank Building, St. Paul, Minn., has drawn plans for a $300,000 hospital building for the Northern Pacific Mutual Benefit Association, of that city. Construction will not begin for several months.

Cicero, Ill., is to build a new school, after plans by Ashby & Schulse, 178 West Jackson Boulevard, Chicago.

The contract for the erection of the Chesapeake & Ohio Railway hospital, at Huntington, W. Va., has been awarded to G. W. Harrar, of that city.

The National Buscuit Company, of New York, will build a three-story office building on Broadway, Albany, after plans by J. R. Torrange, New York.

Bridgewater, N. B., is planning the erection of a municipal hospital, to cost about $50,000.

The contract for the erection of a new school at Ottawa and Main Streets, Hamilton, Ont., has been awarded to the Frid Construction Company, of that city, at $258,800.

The city of Anthony, Kan., is to build a new high school.

The contract for the erection of an armory for Western Reserve University, at Cleveland, has been awarded to Crowell, Lundoff & Little, of that city. The building will cost about $200,000.

Stearns, Woodnut & Schmehl, 21 South Twelfth Street, Philadelphia, are preparing plans for a $200,000 building for the Second National Bank, 4356 Frankford Avenue, Philadelphia.

L. G. Schell, Jefferson City, Mo., has been awarded the contract for the erection of the new court house in that city, at $58,400.

The F. Wyland Building Company, Delman Building, St. Louis, will build a four-story mercantile building and garage in that city, to cost about $125,000.

Joseph & Joseph, Atherton Building, Louisville Ky., are preparing plans for a four-story hospital building in that city, to cost about $300,000, for the Baptist Hospital Association.

New Mexico will vote on November 7 on a proposition to issue $200,000 in bonds for an addition to the State Capitol at Santa Fe.

W. R. McCormick, Cleveland, is preparing plans for a $100,000 normal school on Euclid Avenue and East 109th Street, in that city.

Mankato, Minn., will build a junior high school, to cost about $100,000, after plans by Pass & Son, of that city.

W. Soule, San Marcus Building, Santa Barbara, is preparing plans for manual training and technical buildings at the Jefferson school, in that city.

The Northern Pacific Railway will build a new passenger station at Brainerd, Minn. O. M. Rognan, St. Paul, is preparing the plans.

The trustees of the normal school at Madison, Wis., are planning the erection of barracks and mess hall, to cost $150,000.

Croft & Boerner; Duluth, are preparing plans for an $80,000 school building in that city.

Weeks & Day, San Francisco, are preparing plans for a State office building and a State library at Sacramento.

The congregation of St. Jean Baptiste, Pawtucket, R. I., are planning to build a $100,000 church.

The Canadian government has let the contract for building a technical school at Three Rivers, Que., to Bellereville & Trepanier. It will cost about $150,000.

The First Methodist Episcopal congregation of Rapid City, S. D., will build a church and school, after plans by Edwins & Edwins, Northwestern Building, Minneapolis.

G. L. Preacher, Johnson Building, Atlanta, is preparing plans for two dormitories at the Industrial School, Willington, S. C.

Morris, Shepard & Dougherty, Globe Building, St. Paul, Minn., have been awarded the general contract for the erection of the new $1,000,000 union station in that city.

Van Ryn & De Gelleke, Caswell Block, Milwaukee, are preparing plans for a $100,000 tuberculosis sanitarium at Janesville, Wis.

The contract for the erection of the first unit of the Central Continuation School in Milwaukee has been awarded to E. S. Steigerwald & Co., of that city.

The H. Wales Lines Company, Meriden, Conn., has been awarded the contract for the erection of the Y. M. C. A. building for the Boston & Maine Railway at East Deerfield, Mass. It will cost about $150,000.

Racine, Wis., is planning to erect and equip a $100,000 hospital for disabled soldiers.

The Pacific Coast Shipbuilding Company will build a hotel for its employees, costing about $100,000, at Clyde, Cal. The plans are by A. P. Markwart, First National Bank Building, San Francisco.

Obituary Note

J. H. McInerney, for the past twenty-five years official stone measurer for the Metropolitan District of New York, died on October 25 of influenza. Mr. McInerney was widely known to stone men throughout the entire country and was held in high respect and esteem.

Importations of Graphite

The War Trade Board has modified the earlier restriction upon the importation of graphite (plumbago), The new ruling (W. T. B. R. No. 271), which takes the place of W. T. B. R No. 157, reads:

"No licenses for the importation of amorphous graphite (plumbago) shall be issued hereafter, except such shipments as are of Canadian origin and come overland or by lake from Canada, or of Mexican origin and come overland from Mexico.

"Licenses may be issued for the importation of graphite of crucible grade when the applications therefor are otherwise in order, and where the Chemical Section of the War Industries Board has approved the issuance of said license and has certified that the ultimate consumers of the said graphite have been using at least 20 per cent. of domestic or Canadian flake graphite in the manufacture of their products."

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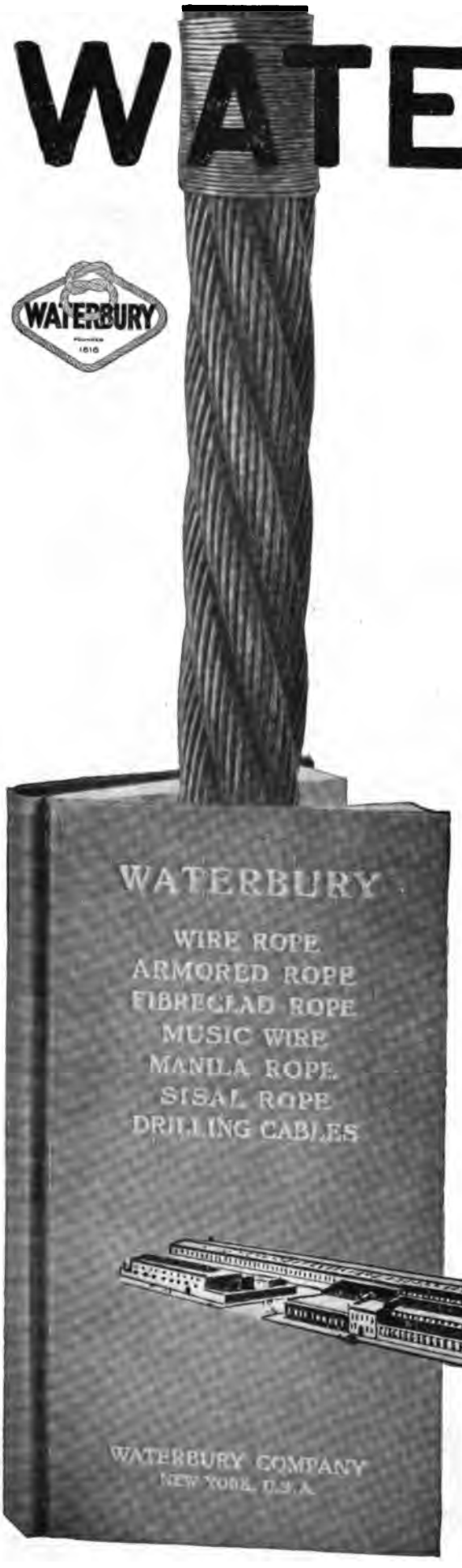

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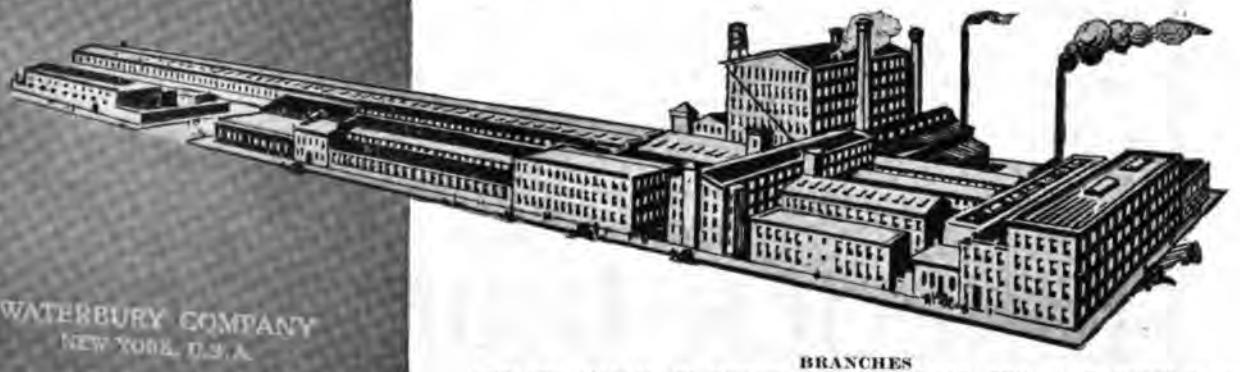

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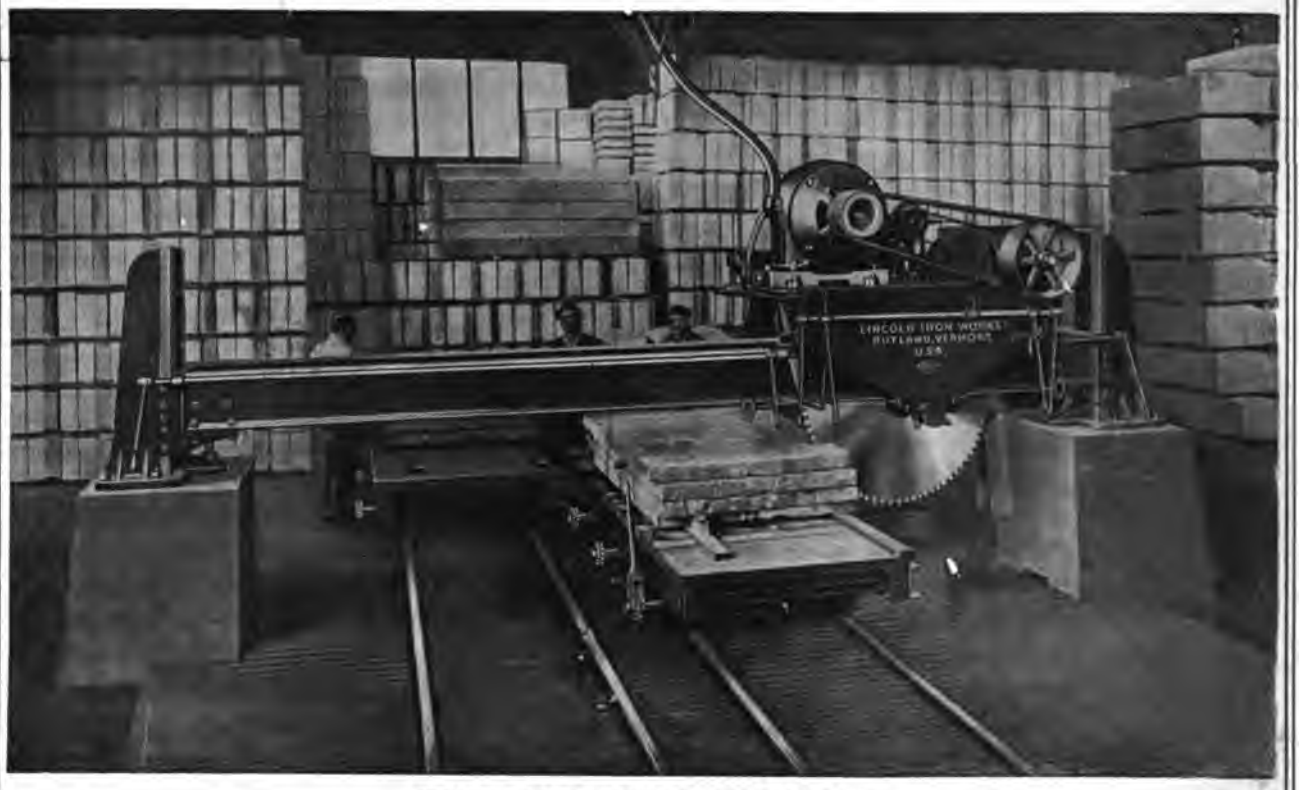

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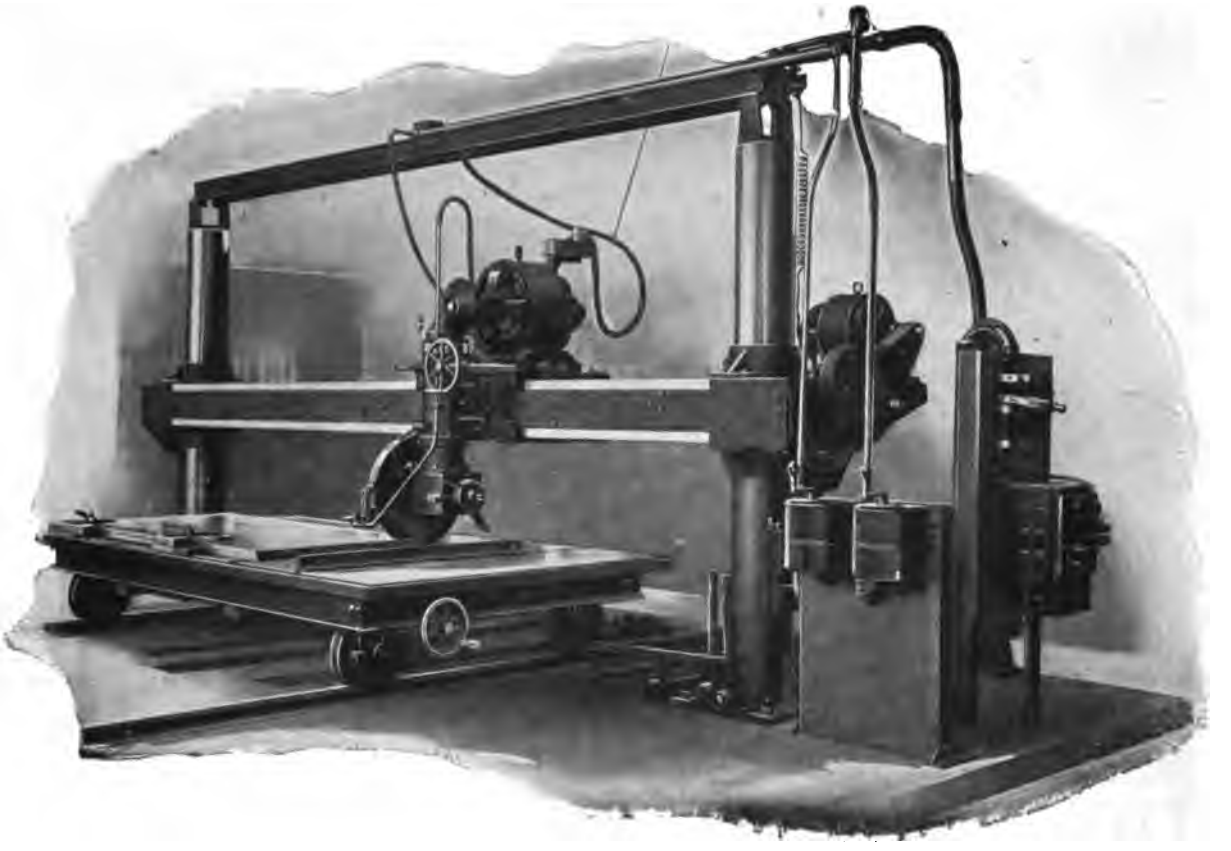

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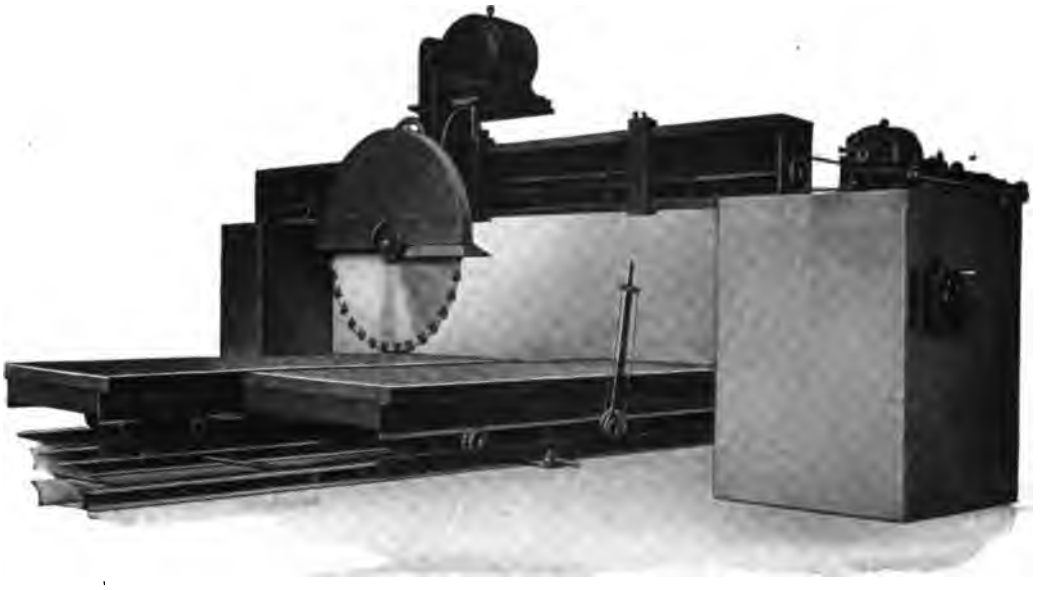

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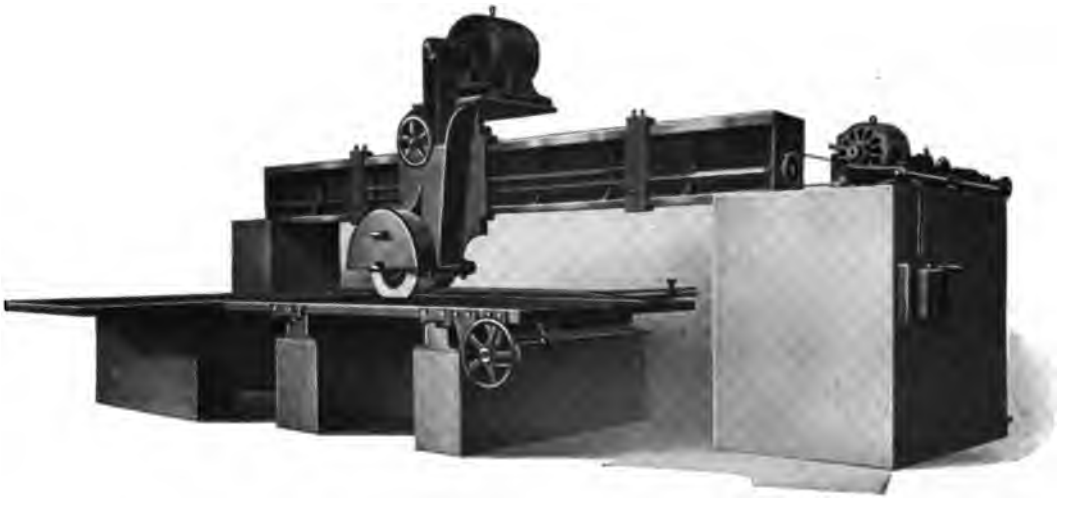

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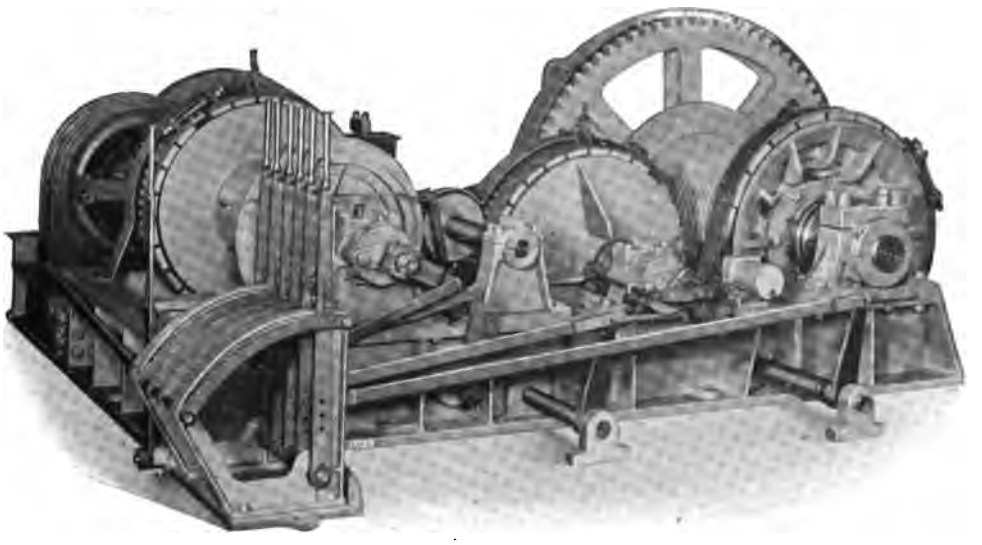

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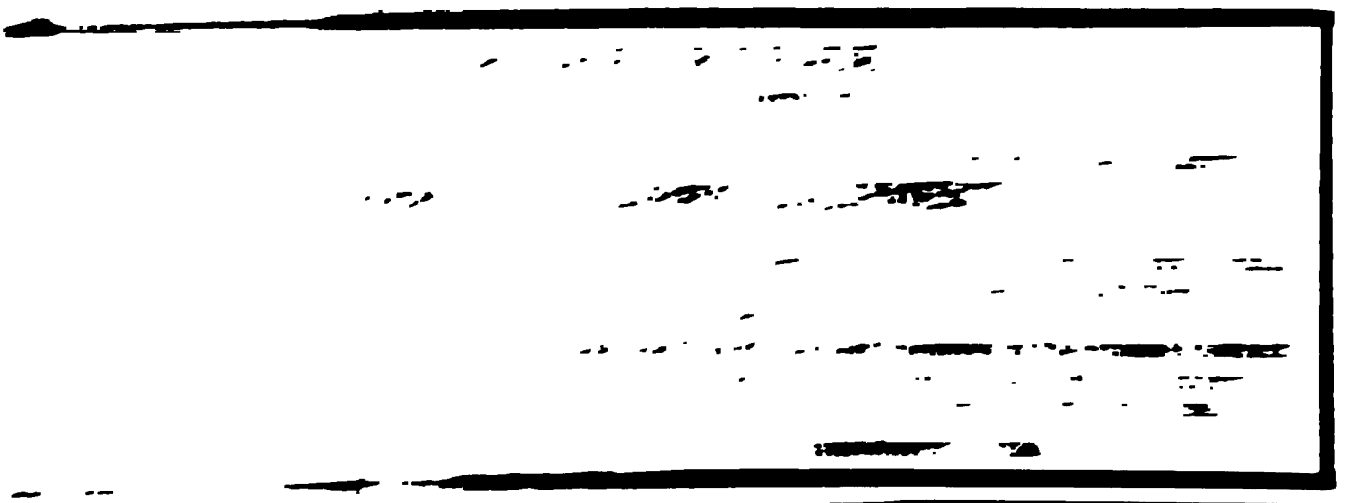

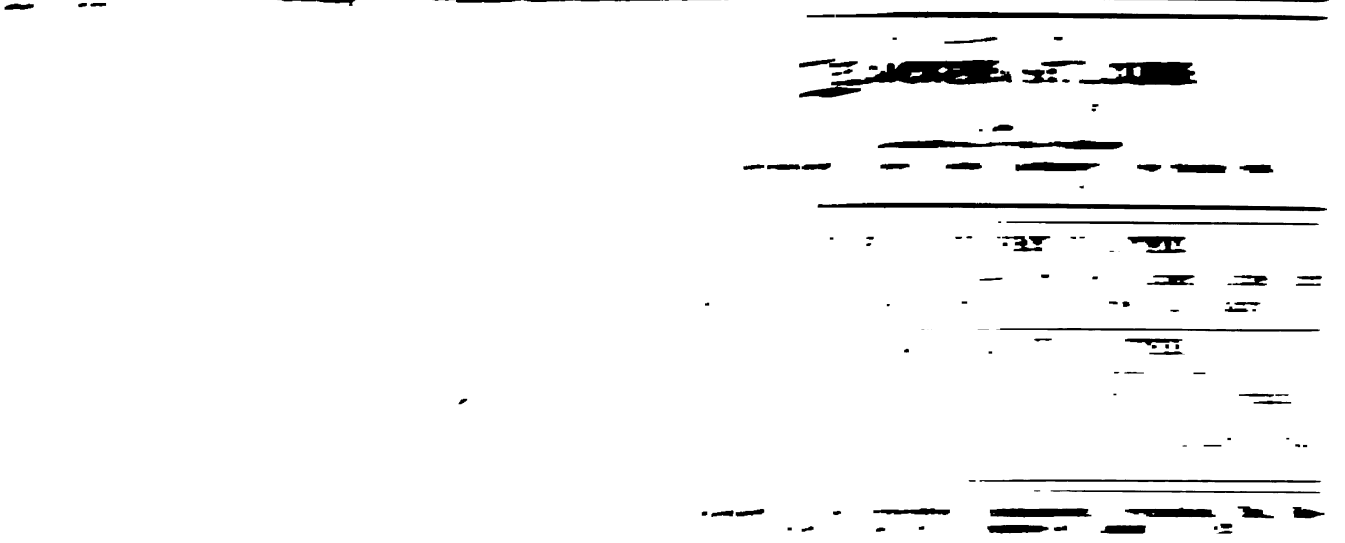

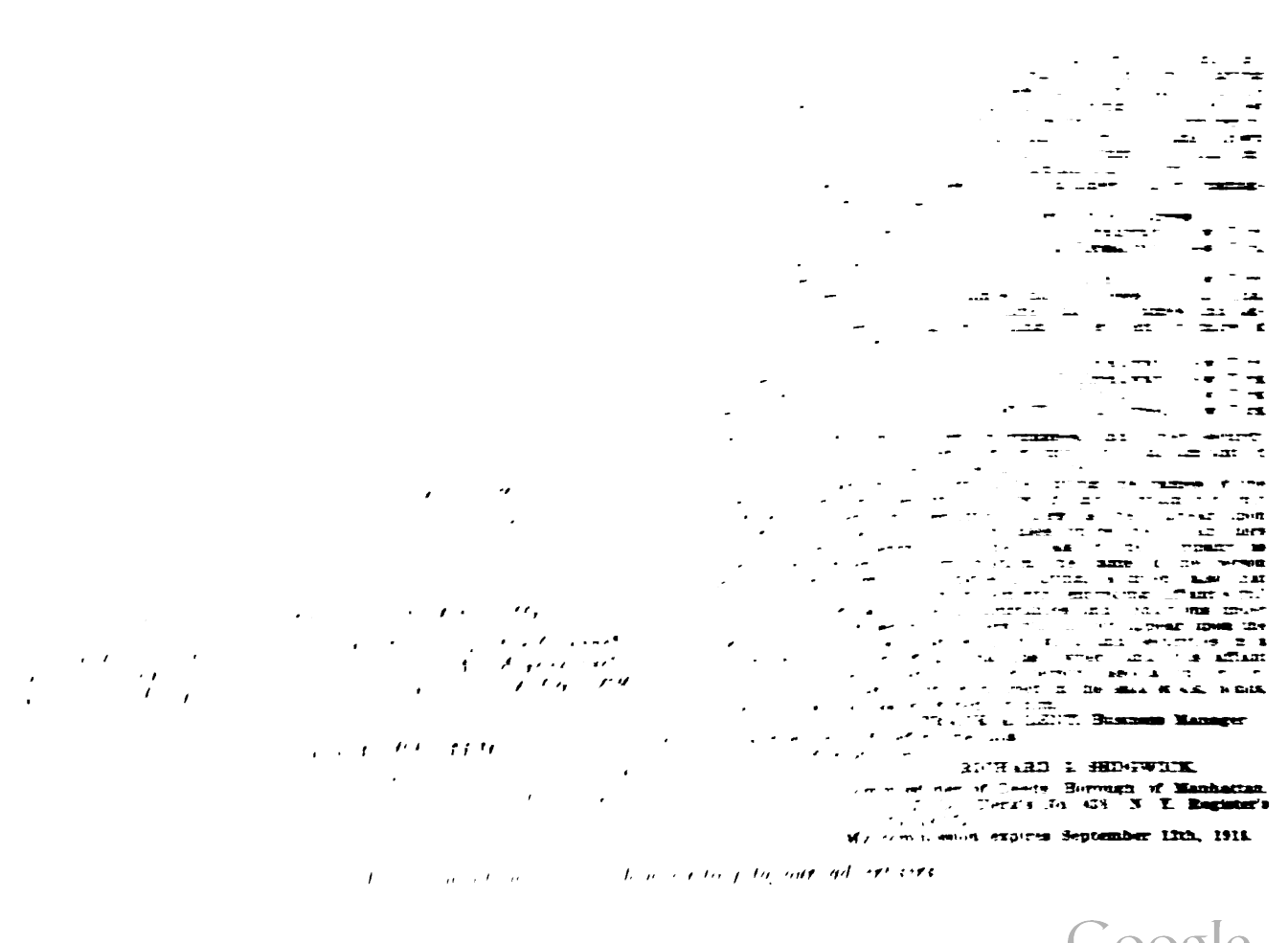

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VOLUME XXXIX | DECEMBER, 1918 | NUMBER 12

CONTENTS

	PAGE
ITALIAN QUARRIES STILL ACTIVE	553
MARBLES OF MICHIGAN	554
MILLSTONES COMING INTO USE AGAIN	554
CAMOUFLAGE FOR STATUARY	555
TALC IN SOUTH AFRICA	556
PRODUCTION OF JADE IN BURMA	556
MUCH BUILDING WORK ALREADY PLANNED	557
STONE TRADE AND BUILDING IN ENGLAND	559
MARBLES OF SANTANDER	559
LABOR SAVING IN LIMESTONE QUARRYING, II, *By Oliver Bowles*	560
EDITORIALS:	
The Duties on Carved Stone	563
As to a Memorial Arch in New York	563
LIMESTONE AND SANDSTONE	564
MARBLE AND GRANITE	565
BUSINESS BREVITIES	565
BIG PROGRAMME OF POST OFFICE CONSTRUCTION	566
FIXING IRON RAILINGS IN STONE COPINGS	566
CONSTRUCTION NOTES	566
HANDBOOK FOR USERS OF WIRE ROPE	567
OBITUARY NOTES	567
BUSINESS EMBARRASSMENTS	567
ILLUSTRATIONS:	
Preble County Courthouse, Eaton, O.	
Marble Fountain at Aldred Home.	
Entrance to Aldred House.	
Tower at Orleans, France.	

ALPHABETICAL LIST OF ADVERTISERS

	PAGE
Alabama Marble	551
Ardolino Brothers	546
Bacon, Earl C.	574
Barr, Thaw & Fraser Co.	546
Bedford Steam Stone Works	546
Blum & Delbridge	546
Bowman & King Stone Co.	546
Brodix & Malone	548
Brown, George & Co.	547
Buckeye Gray Sandstone	545
Cameron, A. S., Steam Pump Wks.	579
Carthage Marble & White Lime Co.	546
Chicago & Bloomington Stone Co.	546
Clark-Conroy & Co.	546
Cleveland Stone Co.	543
Consolidated Stone Co., The	541
Continental Car Co. of America	573
Dallet Co., Thos. H.	577
Dark Hollow Gray Limestone	541
Empire Stone Co.	546
Farrell Foundry & Machine Co.	574
Falt & Co., J. P.	542
Frenier & Son	574
Furst-Kerber Cut Stone Co.	544
Georgia Marble Co., The	549
Gray "Canyon" Sandstone	543
Gillies & Sons, James	546
Hanlein & Son, Henry	342
Harrison Supply Co.	573
Heinlein Cut Stone Co., John	546
Hoosier Cut Stone Co.	542
Indiana Limestone Quarrymen's Association	538-539
Indiana Quarries Co., Inside back cover	
Ingersoll-Rand Co.	568
Laidlaw Dunn Gordon Plant	577
Lane Manufacturing Co.	571
Lidgerwood Manufacturing Co.	577
Lincoln Iron Works	572
Manning, Maxwell & Moore, Inc.	574
Marine, Arlando	546
McDermott Stone Co.	548
McLaren & Sons, James	540
McMillan & Son, W.	542
Mt. Airy Granite	547
Meyers Machine Co., Inc., Willard F.	570
Miller Co., David	546
Moretti-Harrah Marble Co.	551
Napoleon Gray Marble Co.	552
New Albany Machine Mfg. Co.	574
North Carolina Granite Corporation	547
Ohio Quarries Co.	545
Patch, F. R. Mfg. Co., Inside back cover	
Payne & Co., N. B.	574
Phenix Marble Co.	552
Pollard Mfg. Co., Ltd.	575
Quincy Column Turning Co.	548
Rockport Granite Co.	548
Roebling's Sons, John A.	574
"Silk of the Trade"	547
Shaw Electric Crane Co.	574
Shea Donnelly Company	544
South Dover Marble Co.	Back cover
Spurr & Son, J. J.	540
Star Stone Co.	548
Steam Stone Cutter Co.	572
Struble Cut Stone Co., Henry	546
Structural Slate Co.	568
Sullivan Machinery Co.	573
Sutermeister Stone Co., A.	546
Tompkins Kiel Marble Co.	550-551
Tom-Kiel Cement	576
Trow & Holden	576
Waterbury Company	569
West Leechburg Steel Co.	580
Winnesboro Granite Corp.	547
Worthington Pump & Mach'y Co.	577
Zelnicker	580

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The New York Public Library Entrance Facade, showing the six heroic Georgia Marble figures by Paul Wayland Bartlett, sculptor

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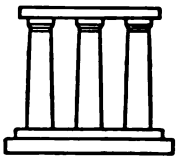

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STONE

VOLUME XXXIX DECEMBER, 1918 NUMBER 12

Italian Quarries Still Active

THE great marble quarries of Italy, those of the Apnau Alps which supply to the world the larger part of what has the general name of Italian marble, are separated from the battlefields of the war by the entire breadth of the Italian peninsula. Of course they were, however, immediately responsive to war conditions. There was a general suspension of building throughout the world, which in itself would have largely curtailed the demand for the quarry products. But even if a demand for the marble had existed, there was a marked shortage of labor, owing to the calling of all available Italians to the colors, the lack of fuel and there were few facilities for the shipping of marble, either by land or sea. This country was one of the principal markets for Italian marble, but an embargo on its importation into America was placed some months ago. Notwithstanding all of these drawbacks, the production of stone in Italy during 1917 reached a total value of more than ten million dollars, and showed a falling off as compared with 1916 of less than one million dollars. An interesting review of quarry conditions and production is given in a recent number of *L'Industria*. That journal says:

"The total value of the quarry stone production for building and ornamental purposes and of other materials for building streets and hydraulic works fell to 52,354,212 lire (about 5 lire = $1.00) in 1916, the difference compared with the preceding year representing 4,389,636 lire. This decrease is ascribed to the smaller output of white and colored marbles and other materials, although there was but a slight fall in the total production. Particular mention must be made of the fact that in the white and colored marble industry, which had suffered so much in 1915, scarcity of labor, stagnation of commerce, increased cost of raw materials, and the great rise in freightages for foreign countries which imported nearly all the worked marble, all these causes acted with increasing effect.

"In 1916 the production of rough and worked marble fell from 246,883 to 200,700 tons, representing a total value of 10,505,025 lire. This decrease was partly due to the quarries of the Apuan Alps, which only produced 171,154 tons, compared with 199,734 tons of rough marble in 1915. Then the output of the quarries of Veronese and Vicentino (only 9,776 and 11,150 respectively) fell to 3,250 and 5,126 in 1916. Of the rough marble quarried, 122,732 tons were worked, 98,660 in saw mills and 24,072 in workshops, the total value being 11,145,620 lire; the rough marble remaining represented 49,133 tons. Exports, which as in the past consisted of superior qualities of marble, principally sawed rather than rough, showed a decrease of 13,451 tons in 1916, although there was some rise in exports, especially to France, Switzerland and the United States.

"The number of workmen at the Apuan quarries was 5,077, compared with 6,960 in 1915, the number of workings remaining about the same, viz., 173 instead of 174. The cost per ton of marble quarried decreased from 22.93 to 19.74 lire, whilst the yield per workman increased from 28.7 tons in 1915 to 33.71 in 1916. The production of other materials for building, streets and hydraulic works continued to fall, owing to the almost general stoppage in the building trade and the difficulties in the manufacture of cement, due to the exorbitant prices of fuel and its scarcity. The production of granite was about half that of 1915, that of porphyry only 3,000 tons, whilst limestone dropped from about 1,500,000 tons produced in 1915 to 1,100,000 in 1916. Finally, it is asserted that in Sardinia the trachytic tufa quarries of M. Gordiani (Ozieri), which produce a stone admirably suited for ornamental works, have been well developed, and that at Trani a marble company has been formed under the style of "Societa per l'Industria del Marmo e delle Pietre Dure della Puglie" (Society for the Industry of Marble and Hard Stones of Apulia), which has even commenced exports on a small scale. There was an increase of work in other quarries than those previously mentioned, the value of the production representing 9,385,108 lire, against 6,032,363 in 1915. Amongst the materials most largely produced, owing to cessation of imports, is talc, production of which exceeded by 4,000 tons that of the previous year quartz felspar, representing a value of

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more than 1,000,000 lire kaolin and kaolin clays, valued at more than 2,000,000 lire.

The increase in production of talc and steatite is ascribed to the more intense development of the workings in the district of Turin to supply industries like that of paper, which had not previously used talc, or to meet demands principally from France and Egypt. The greater activity in the quartz quarries near Lumiere (Campiglia Marittima) and those of quartzose sand at Pietratonda and Casal di Pari, likewise the sand quarries of Riviera, made it possible to reach the figures indicated. The great increase in production of kaolin was chiefly due to the working of the Tuscan quarries, and there is good promise of improvement in the Sardinian quarries of Furtei and Serrenti. Other materials of which there was a gratifying increase are as follows: Magnesite (chiefly at Castiglioncello), some other refractory products, limestone for foundries, baryte and colored clays.

Marbles of Michigan

The limestone formations of Michigan are massive and widely distributed, and they are extensively quarried for fluxing and other commercial purposes. As yet the development of quarries to furnish building and decorative material is but beginning. *Iron Ore,* of Ishpeming, in a recent issue, has given a brief sketch of the limestone formations of the state. The limestones of the Crystal Falls district have a thickness of about 1,500 feet, varying from coarse crystalline marble in places, and very pure, to fine-grained little altered limestone locally shading into dolomite sandstone and shale, says the newspaper. The color is generally white, but various shades of pink, light green and pale and dark blue are not uncommon. The Randville dolomite underlies a large part of the Felch mountain district and is very thick. In the Menominee district it occupies three separate beds extending in a more or less east and west direction. The formation, though dominantly dolomite, is composed of heterogeneous beds including silicious dolomite, calcareous quartzite, argillaceous and cherty quartz rocks. It grades downward into the Sturgeon river quartzite. The predominant phase is homogeneous fine-grained white, pink, blue or buff dolomite. These beds vary in thickness from a few inches to several feet. Thin veins of quartz running parallel to the bedding, or running irregularly through the rock mass are characteristic.

At two points only, so far as we know, are deposits worked for decorating purpose, one at Ishpeming, where the Michigan Verde Antique Marble Company is operating, and where a pronouncedly beautiful marble is being secured, and another near Randville, in Dickinson county, where a pinkish marble is being obtained. The Ishpeming marble is particularly well adapted to interior finishes, being very rich in its many shades of green, with the white streaks that denotes its trueness to the verde antique class. A railway spur is now about finished to this quarry, and, when it is ready, blocks of marble, now ready, will be sent out for sawing and polishing and cutting into commercial shapes to fill many orders that have long waited filling.

The first knowledge of this verde antique marble range dates back to the eighties, when the late Julius Ropes, of Ishpeming, discovered it and brought it to the attention of the people of this region. Several weak attempts were made at developing the mass, but they were badly directed and naturally failed through lack of money as well as of proper knowledge of how to secure the stone. Now in practical hands, the present company seems well on the road to a very successful conducting of this enterprise. The company has been prospecting and developing its lands for the last two years, has already placed a considerable quantity of the marble on the market and has done enough in the way of introduction to warrant the opinion that it will be a very popular ornamental marble.

The Cleveland-Cliffs Iron Company, of Ishpeming, in the construction of its magnificent new hospital, now nearing completion, has used the marble in the main entrance of the building, carrying it to a height of eight feet in the entrance and to the main corridor of the first floor. It is also seen in other portions of the building, and here one gets a comprehensive idea of its appearance, the liberality of its use permitting this. It was not only a loyal thing to use it, but its particular beauty also warranted it. Undoubtedly many prospective users will seek this opportunity of learning of its appearance on the walls.

Millstones Coming into Use Again

The value of the millstones (burrstones) and related quarry products—chasers, dragstones and pavers—sold in the United States in 1917 amounted to $43,489, a decrease of 2.4 per cent as compared with 1916 and of 18.7 per cent as compared with 1915, according to the Government figures. The production in this country in 1917 was less than in 1912, 1913, 1915 and 1916, but larger than any other year in the decade.

The setback in the millstone market in the late eighties and nineties because of the introduction of modern grain-milling machinery has been offset to some extent in the last twenty years by the growing use of millstones for grinding mineral products, such as feldspar, quartz and pigments.

American millstones have been and are still for the most part made of quartz sandstones and conglomerates. Some are made of granite. The production recorded in the Survey's reports on mineral resources is only that which has been made for other than purely local use. A small number of stones for local use have been made of hard quartz or other rocks, particularly in the mountain sections of the Southern States.

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Camouflage for Statuary

THE Custom House in New York is notable among American buildings for its enrichment with statuary. It surpasses almost any other of our public structures in the number and beauty of of its embellishments. On pedestals flanking the entrance are four great groups, carved in Tennessee marble, symbolizing the continental divisions of the world. Above the main cornice are twelve symbolical figures. One of these, by Albert Jaegers, represented Germania. It was a heroic female figure, mailclad, with a shield bearing the insignia of the German Kaiser. When this country was forced into a declaration of war against Germany there were, naturally, complaints against any such adornment of a Federal building, and insistent demands were made that it be removed, or be changed in some way so that it would no longer be a cause of offense. In September Cass Gilbert, the architect of the building, announced that he had been authorized by Secretary McAdoo to substitute Belgian for German insignia on the statue.

A short time afterwards scaffolding was built around the marble Germania, and Giuseppe Piccirilli, the sculptor, began the work of alteration. At a meeting of the National Sculpture Society, one of the members made the charge that Albert Jaegers had refused to make the necessary changes in his statue because he had received a decoration from the Kaiser. At a subsequent meeting of the society Mr. Jaegers received permission to read a statement refuting this charge. The society had been misinformed, he said, although unintentionally.

"I declined Mr. Gilbert's request," he continued, "to change the statue in question into one supposed to represent Belgium for a reason that should not be necessary to express to you, of all men. In my consultation with Mr. Gilbert the decoration given to me by the German Emperor never came to my thought at that time. It was not my reason for declining and was not given as my reason. It was not mentioned at all either by Mr. Gilbert or myself.

"The Secretary of the Treasury, who has the control of this work, has never given the final authorization to make the changes in question and probably never will, so that, had I consented to Mr. Gilbert's request, I should probably not have been permitted to execute it."

He then read a letter he had written to Secretary McAdoo on October 19, which said in part:

"While there is no ethical or professional reason why I should have either the right or the duty to do

PREBLE COUNTY COURTHOUSE, EATON, OHIO

Architects: Richards, McCarthy & Bulford, Columbus. Associated Architect: H. H. Hiestand, Eaton, Cut Stone Contractors: South Side Stone Company, Bloomington, Ind. Built of Indiana Limestone, from the Indiana Quarries Co.

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the statue of Belgium because I did the one of Germany, I shall be only too glad to comply with your wish. Unfortunately, however, Mr. Gilbert outlined a plan by which my existing statue of Germany was to be turned into a statue of Belgium by means of a little camouflage with a relabel—a somewhat dubious honor for plucky little Belgium.

"To an artist the plan is obviously impossible. For him to try to comply with a request so strange would mean an admission that his work in question is so lacking in character that merely a different label is needed to make a different subject of it. I am not ready to humiliate myself by such an admission.

"It seems, however, that my request to be excused has exposed me to sharp criticism even from men in my own profession, who have misunderstood what was requested of me. * * * For many years my services have been commanded by the Government, through the War Department, and are entirely at your disposal now."

Jaegers added that he had made to Mr. McAdoo a suggestion which he was not able to report, as it was under discussion.

It is needless to say that Mr. Jaegers raises a most interesting point in artistic ethics. Granting that even the good-natured and tolerant Americans would not stand a mailclad Germania looking down upon our thronged streets, after the revelation during the past four years of what the German spirit typified, some may question whether the course that has been followed is the wisest and most dignified. With the many banking, insurance and business buildings that have seen fit to change their adornment, there can be little objection if Germania is hastily transformed into Columbia or the Prussian eagles into the American eagle. But the Custom House statues were supposed to be pure works of art, and art does not lend itself to what Mr. Jaegers has so happily called camouflage. It would seem as if America could have hegistered its high and solemn resentment against German *kultur* in the most striking and emphatic way if the offending statue had been simply removed and destroyed, and the pedestal left vacant for a year or two. Then its place could have been worthily filled by a statue which should fitly typify the heroic defense of Belgium. And it would have been a graceful tribute if the commission for the work had been given to a Belgian sculptor.

Talc in South Africa

Talc has a wide distribution in the older rocks of the Union of South Africa, but has hitherto been worked only in the Barberton district of the Transvaal and in one or two other localities, says a commercial journal of Pretoria. In the Barberton district the talc occurs in the form of nearly vertical bands up to 15 feet in thickness, bounded by smooth joint planes, the "country" being a pale, dirty grayish or greenish massive ultrabasic rock, rich in magnesia, belonging to the Jamestown series. The purest form of reef matter constituting the first quality of "ore" is a delicate, pale greenish, subtranslucent rock possessing a well-developed fibrous structure, the slightly curved fibers being arranged more or less parallel with one another. Dark-colored varieties, often deep green and quite opaque, form the second quality of ore. Gold occurs in the talc as thin smears and films on joint planes, and the occurrence was originally worked as a gold mine. At present gold is a by-product of the talc-mining operations. The deposits have been opened up by means of shafts and tunnels and the reserves of talc are said to be enormous.

The better grades of ground talc have been found well adapted to the manufacture of paper and rubber, and as the talc can be cheaply mined and railage from Noordkaap Siding to Delagoa Bay is only 3s. 6d. per ton, it is confidently anticipated that a big export trade will be developed.

Ground talc is also being prepared in Johannesburg from a talcose schist, said to occur in the old granite to the north of Krugersdorp, Transvaal. No information regarding the deposit is available. Ground talc suitable for covering boilers and steam pipes is being obtained from a talc-tremolite rock near Pomeroy, on the Maceheko River, in Zululand. Massive talc or soapstone is a common mineral in southern Rhodesia, occurring in the Basement Complex in large bodies in a more or less pure form. The fibrous variety used in paper making also occurs; the writer has seen some very fine specimens of foliated talc from this territory. A number of talc claims have been pegged in different localities, but as yet no attempt has been made to work any of the deposits.

Production of Jade in Burmah

Jadeits, or Burmese jade, come from the district of Myitkyina in the extreme northern part of Burma, writes Consul Lawrence P. Briggs, from Rangoon. The industry is entirely in the hands of the Chinese, and the product is taken to China. The quantity is increasing only gradually, but the value of output increased enormously during the last year on account of the unusually large amount of jewel and ornamental jade produced during the year. Small quantities of amber are produced, also by the Chinese, in the district of Myitkyina above the jade mines. Of jade 11,437 hundredweight and of amber 77 hundredweight were mined during the last three years.

Lettering on Marble

Lay out the letters then size with gelatine water size, after which with several coats of size thickened with whiting, rub smooth each soat as it dries. Then apply evenly a coat of gold size, apply the gold leaf, and burnish with an agate. To get the best effect, apply several leaves of gold.

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Much Building Work Already Planned

ARDENTLY as peace was desired, what is undoubtedly the end of the war came sooner than any one dared to hope. We all knew that peace would bring with it great problems of readjustment and reconstruction, almost as momentous as those that were suddenly thrust upon us when we entered the conflict. We meant to prepare ourselves for this transition, and had already taken steps in that direction. But as a matter of fact we have actually made less progress than Great Britain, which began grappling with reconstruction problems some months ago. Americans are resourceful and move quickly, once they have made up their minds, as we abundantly proved as soon as we made declaration of war. We shall move forward without much hesitation or confusion, and shall soon strike our stride. Demobilization, readjustment and cancellation of government contracts, and the turning of war industries into their wonted peaceful channels, these are the lines of action we took immediately the armistice was signed.

Even before we ourselves entered the war, the shortage in public, business and domestic buildings was acutely felt. Many causes combined to curb building activity. With our troops moving overseas by the millions and all of our energies strained to serve them and our allies with food and munitions, the Government was forced to lay a strict embargo. This worked a grievous hardship to the general public, which imperatively needed housing, and especially to every branch of the building industry. But we all accepted the inevitable, loyally and without complaint. Now we must turn to and build as we never have before in our history. Public edifices, schools, churches, business buildings, factories, hotels, apartment houses, dwellings, and still more dwellings; these we must have at once and in every part of the country. Prices are higher in every line throughout the world than have ever been known before, and they are likely to remain high for some time to come. But as we showed in these columns last month, there has been less advance in the building industry, both as to materials and labor, than in almost any other line of business. Therefore nothing is to be gained by further holding up of our very necessary building programme. The National Government recognized the imperative need of haste and lifted the embargo on construction work at once. The Fuel Administration has also entirely removed all restrictions as to the use of fuel for the production and manufacture of building materials.

East and west, north and south, the shortage of buildings has been felt and construction work will begin at the earliest possible moment. Plans were perfected and financing arranged for much important work months ago, but this has been held in abeyance, awaiting peace and more settled conditions. In addition to this, the shifting and changing of industries brought about by the war have shown the need of instant and intensive building in localities that had no previous expectations of a boom. There is also a likelihood of the Government entering into an extensive construction programme in the interest of public welfare by the construction of public improvements of

MARBLE FOUNTAIN IN ALDRED HOME, LOCUST VALLEY, N. Y.

Of Pink Tennessee Marble, 8 feet in diameter. Railing of Indiana Limestone. Cut and set by George Brown & Co., New York. Landscape Architect: Frederick Olmstead.

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many kinds. According to a survey of the country made by the F. W. Dodge Company, publishers of Dodge Reports, there is a grand total of over $450,000,000 of projected construction from the offices of about 400 architects and engineers. This is distributed as follows:

NEW YORK CITY.—Total proposed construction (from 91 offices), $70,575,000, exclusive of $9,000,000 for city schools, divided approximately as follows: Industrial and office buildings, $22,420,000; apartment houses, hotels and residences, $11,065,000; institutional, churc hand municipal buildings, $23,305,000; still unclassified, but divided among foregoing classes, $13,785,000.

BUFFALO, N. Y.—Total proposed construction (from 14 offices), $3,693,000, divided approximately as follows: Industrial and office buildings, $970,000; apartment houses, hotels and residences, $1,648,000; institutional, church and municipal buildings, $1,075,000.

NEWARK, N. J.—Total proposed construction (from 8 offices), $4,255,000, divided approximately as follows: Industrial and office buildings, $3,080,000; apartment houses, hotels and residences, $655,000; institutional, church and municipal buildings, $520,000.

BOSTON, MASS.—Total proposed construction (from 12 offices), $20,816,000, divided approximately as follows: Industrial and office buildings, $175,000; apartment houses, hotels and residences, $395,000; institutional, church and municipal buildings, $3,860,000; still unclassified, but divided among foregoing classes, $15,386,000.

WORCESTER, MASS.—Total proposed construction (from 7 offices), $1,820,000, divided approximately as follows: Industrial and office buildings, $805,000; apartment houses, hotels and residences, $210,000; institutional, church and municipal buildings, $905,000.

EASTERN MASSACHUSETTS CITIES (Outside Boston).—Total proposed construction (from 17 offices), $3,885,000. Divided approximately as follows: Industrial and office buildings, $770,000; apartment houses, hotels and residences, $1,515,000; institutional, church and municipal buildings, $1,570,000.

MAINE AND NEW HAMPSHIRE.—Total proposed construction (from 8 offices), $1,350,000. Divided approximately as follows: Industrial and office buildings, $175,000; apartment houses, hotels and residences, $375,000; institutional, church and municipal buildings, $850,000.

CONNECTICUT, MASSACHUSETTS. — Total proposed construction (from 9 offices), $6,089,000. Divided approximately as follows: Industrial and office buildings, $1,845,000; apartment houses, hotels and residences, $782,000; institutional, church and municipal buildings, $3,462,000.

TRENTON AND CAMDEN, N. J.—Total proposed construction (from 11 offices), $3,955,000. Divided approximately as follows: Industrial and office buildings, $675,000; apartment houses, hotels and residences, $145,000; institutional, church and municipal buildings, $3,135,000.

PHILADELPHIA, PENN.—Total proposed construction (from 42 offices), $43,740,000. Divided approximately as follows: Industrial and office buildings, $14,968,000; apartment houses; hotels and res-i dences, $13,724,000; institutional, church and municipal buildings, $15,032,000.

EASTERN PENNSYLVANIA CITIES.—Total proposed construction (from 15 offices, outside Philadelphia), $4,250,000. Divided approximately as follows: Industrial and office buildings, $1,195,000; apartment houses, hotels and residences, $400,000; institutional, church and municipal buildings, $2,620,000.

BALTIMORE, MD.—Proposed construction (from 18 offices), $4,160,000, divided approximately as follows: Industrial and office buildings, $615,000; apartment houses, hotels and residences, $1,105,000; institutional, church and municipal buildings, $2,480,000.

PITTSBURGH, PENN.—Total proposed construction (from 42 offices), $15,575,000, divided approximately as follows: Industrial and office buildings, $3,675,000; apartment houses, hotels and residences, $5,860,000; institutional, church and municipal buildings, $5,875,000.

CLEVELAND, OHIO.—Total proposed construction (from 19 offices), $34,450,000, divided approximately as follows: Industrial and office buildings, $7,500,000; apartment houses, hotels and residence, $2,250,000; institutional, church and municipal buildings, $24,700,000.

COLUMBUS, OHIO.—Total proposed construction (from 2 offices), $3,535,000, principally in industrial and office buildings; apartment houses, hotels and residences, $250,000; institutional, church and municipal buildings, $760,000.

CINCINNATI, OHIO.—Total proposed construction (from 6 offices), $2,005,000, divided approximately as follows: Industrial and office buildings, $525,000; apartment houses, hotels and residences, $100,000; institutional, church and municipal buildings, $1,380,000.

CHICAGO, ILL.—Total proposed construction (from 42 offices), $144,047,000, divided approximately as follows: Industrial and office buildings, $128,033,000; apartment houses, hotels and residences, $1,929,000; institutional, church and municipal buildings, $14,085,000.

DETROIT, MICH.—Estimate 1,064 projects, total valuation, $46,100,000, ready to mature in Eastern Michigan within year if ban is lifted. Small private plan projects will probably add 1,000, with valuation $4,000,000, within year. Total over $50,000,000.

ST. LOUIS, MO.—Following work held up account of war: Four factories, $1,800,000; theatre, $160,000; two hotels, $235,000; three stores, $65,000; three

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colleges, $130,000; two boiler houses, $65,000; one church, $30,000; three lofts, $109,000; five schools, $1,040,000; one convent, $200,0000; one garage, $60,000; one club, $35,000; eight apartments, $540,000; sixteen residences, $404,000; three flats, $25,000. Total, fifty-five projects, to cost $4,898,000.

KANSAS CITY, MO.—Local architects have and are preparing plans for approximately fifty new buildings, cost aggregating $20,000,000; majority of projects awaits only the lifting of the Government ban on materials; hundreds of houses and homes will be added as soon as materials, men and transportation can be depended on.

MINNEAPOLIS, MINN.—Office and store building, $400,000; church, $20,000; office, warehousee, etc., $1,000,000; industrial enterprise, offices, etc., $1,000,000; about $10,000,000 of school work throughout Northwest will go ahead.

The Stone Trade and Building in England

The formal opening of the new rooms of the Bradford Building Trades and Stone Exchange at Bradford, Eng., took place recently. Mr. George Wilkinson (president of the Stone Exchange), in opening the proceedings, said that the members of the Exchange were the men who were responsible for the building of houses in Bradford. They did so for business purposes, and when they found that the commodity they produced did not sell they gave up building. If private enterprise had failed to provide houses it had failed also to purchase houses. He did not profess to say who should be responsible for housing the workers, but the large manufacturers had not come forward as purchasers on behalf of their workpeople and the builders, having no sale, had given up building. For some reason no money had been put into houses for the past ten years, and the stone trade had almost "winked up." In declaring the rooms open, the Lord Mayor remarked that the Government had said that 300,000 houses would be required after the war. Who was going to provide the money for housing? He supposed they would not have to worry about that, for if the nation could find $35,000,000 a day for war purposes money would be found for housing. He did not think that Parliament had been fair to property owners. Commodities had increased in price, wages had gone up, and so had the cost of repairs, yet owners of houses up to $100 were not allowed to increase the rents. Perhaps the time would come when the general public would see the iniquity of such a distinction.

The Marbles of Santander

Consul John H. Grout, writing from Santander, Spain, says that mining is the leading industry in that province, and that cement can be produced, as there are abundant limestone deposits. The province also possesses valuable marble quarries. The King Alfonso quarry produces black marble, better known as Flanders granite from the fact that up to the present Belgian firms have had a practical monopoly in the production of this marble. The deposit is in layers or strata, which makes the working much easier and more economical, as the quarrying can be done by driving in wedges between the layers. The production seems to be very abundant, a casual survey seeming to guarantee 100,000 cubic meters. Another quarry, known as the Queen Victoria, produces marble and alabaster of different colors, the veined kind being specially abundant. In this quarry the marble occurs in large compact masses to the extent of 500,000 meters, and it would be possible to start working in 25 or 30 different places at the same time within its radius.

The concession of the land on which these quarries are located was granted for a period of five years, with the option of five years' extension, on the understanding that as soon as the quarries were started working the permission would be granted in perpetuity.

ENTRANCE OF J. E. ALDRED RESIDENCE, LOCUST VALLEY, N. Y.

Architect: Bertram Goodhue. General Contractor: C. T. Wills. Cut Stone Contractor: George Brown & Co. Built of Peerless Indiana Limestone from the quarries of W. McMillan & Son.

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Labor Saving in Limestone Quarrying—II

By OLIVER BOWLES

VARIOUS methods in common use for the removal of stripping have been described in other publications of the Bureau of Mines. The purpose of the present publication is to give special consideration to their respective labor requirements.

Loading waste material into dump carts or cars with hand tools is doubtless recognized by most quarrymen as involving the most prodigal use of labor, per ton of material moved, of any method in common use. Fortunately, it is not commonly employed except in very small quarries.

Where the overburden rests on a reasonably smooth rock surface, and the dumping ground is near by, the employment of teams and scrapers results in a pronounced saving of labor over hand methods. Where the waste must be moved a considerable distance a method has been noted whereby the scraper loads are dumped through an opening into wagons on a depressed roadway, the soil being thus handled in two operations. Under such circumstances wheel scrapers are to be preferred for thus a single operation will suffice, and such simplification reduces the labor requirement.

A drag-line scraper alone has been used effectively where conditions are favorable, and a drag-line scraper used in conjunction with dump cars as described in Bulletin 160 may be used to advantage. By either method the heaviest burden of the work is accomplished by machinery, and the labor requirement is not high.

The most popular stripping equipment for large quarries is the steam shovel. It requires a small gang of men, and when properly handled and well supplied with cars can load a great mass of material in a day. Efficient service depends on strong mechanical construction, adequate care and operation by a skilled runner. Where efficiency in steam shovel operation is in evidence it usually results from inadequate car service for removal of loaded material rather than from improper handling of the steam shovel itself. However, this subject is considered in connection with transportation problems.

While the first cost of a steam shovel is high, with proper care the cost of maintenance is not excessive. Where the rock surface is fairly uniform and level the steam shovel is probably the best equipment for loading any considerable thickness of overburden.

A stripping conveyor to be used in conjunction with a steam shovel is illustrated and described in a former publication. Such equipment cannot be generally employed, for it is applicable only to quarries where the overburden may be conveniently disposed in the pit formed by removal of the good rock.

With adquate water supply, proper drainage and sufficient waste-disposal area, hydraulic stripping is probably the most economical of labor of all methods in common use. With two men at the pumping station and two to handle the nozzle, a great mass of debris may be washed down in a single day. The rate of removal depends on the size of the nozzle, the available water pressure, and the consistency of the soil. The rate of progress may be retarded if the overburden is hard, for it may be necessary to bore it with a soil auger and blast with powder. The presence of numerous bowlders may also render hydraulic stripping difficult.

As labor is the chief cost item in stripping, the cost per cubic yard is a fair indication of the relative labor requirements of various processes. The following figures representing minimum costs noted by the writer during field investigations may be of interest in this connection: Hand shovel and dump cart method, 30 cents per cubic yard; steam shovel and cars hauled by dinkey engine, 16 cents; steam shovel and stripping conveyor referred to above, 3 cents; drag-line scraper (to loading platform only), 3 cents; hydraulic stripping, 3 cents.

For multiple-bench or snake-hole quarrying, tripod drills are generally used, though of late years large hammer drills have been used successfully by many operators. For ledges not exceeding 40 feet in thickness wagon drills are successfully employed in a few localities. For single-bench quarrying, with the quarry face 25 feet or more in height, churn drills are now widely used.

Tripod drills require two men each, a runner and a helper, except that in some instances one helper is deemed sufficient for two drills. Hammer drills require no helpers, and are therefore more economical of labor than tripods. Wagon or churn drills usually require two men each, though some electrically operated churn drills employ only one man each.

The churn drill, while it is a comparatively recent type of equipment in limestone quarries, is rapidly gaining in favor and is in successful use in a great many places. While there are conditions where it is claimed that other types of drills render better service, from the standpoint of labor requirements the churn drill has this advantage that it accomplishes the work of four or five tripods or hammer drills with no greater labor than is required for a single tripod. A quarry operator in Pennsylvania claims that one churn drill, one tripod, and one hammer drill accomplish as much as was formerly done in the same quarry with five tripods and three hammer drills. Estimating the labor requirement conservatively the old method would require 11 men and the new method 5.

One Texas operator reports that when he employed five tripod drills his plant was frequently shut down

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through lack of rock; and when one churn drill was substituted for the five tripods the plant was continually supplied, and the drill was used part of the time only.

As in the case of stripping, the relative direct cost of drilling with various types of equipment is a fair measure of their relative labor requirement. S. R. Russell, in an article entitled "Loading and shooting big blast holes," estimates that the average cost of steam tripod drilling is about 8 cents per cubic yard of rock quarried, while the average cost of churn drilling is about 2 cents. These figures indicate that the churn drill promotes labor economy.

When churn drills are employed, not only is there a decided saving of labor in the actual drilling process, but their employment may also result in a marked saving of labor in other departments. Where tripod drills are employed in deep quarries the face must be worked down in a series of benches. Bench cleaning is therefore necessary, and tracks must be moved frequently. One quarryman reports that the introduction of churn drills released 15 men formerly employed in operations now rendered unnecessary by the introduction of the new equipment.

The actual loading, tamping, and wiring of charges in drill holes are processes in which there is little variation in method, and moreover little labor is involved in these operations. There is, therefore, no way in which any appreciable amount of labor may be saved by modifying the mechanical processes connected with blasting.

While the actual processes of loading and tamping drill holes afford no means of appreciably conserving labor, blasting efficiency has a direct bearing on the labor required in subsequent operations. Improper arrangement of drill holes, imperfect balancing of charges, or the use of too powerful or too weak an explosive may result in a very inefficient blast, and as a consequence rock loading may be greatly hampered. There is in fact no other department of the quarry in which inexperience or lack of judgment may in a brief period occasion more disastrous consequences. This is particularly the case where many large blasts are fired simultaneously in deep churn-drill holes, for the mass of rock thrown down may occupy the rock loaders for a period of several weeks or even months. If the rock is imperfectly shattered, or improperly thrown down excessive secondary blasting may be required, and the process of loading may be slow and difficult throughout the entire period. On this account it is false economy, both of money and labor, to employ cheap and inexperienced men for blasting foremen.

If, on the other hand, blasting is done by an experienced man of good judgment, subsequent operations may be greatly simplified. If the rock is thoroughly shattered, little labor is required for secondary blasting, and if the rock fragments are thrown down in a way that permits easy handling, loading operations may be performed rapidly and with minimum effort.

A realization of these facts has led some operators to engage the services of blasting experts who are not permanent members of any quarry organization, but who travel about from quarry to quarry as their services are desired. The expert, in accordance with his judgment, developed by long experience, supervises the arrangement and spacing of drill holes, selects the explosive, proportions the charge for each hole, carefully inspects or tests all connections, and fires the charge. The efficiency of the results usually obtained amply justifies the employment of such experts.

The labor required for secondary blasting depends on various factors, the chief of which are efficiency of primary blasting, the physical character of the rock, the method of rock loading, and the method of secondary blasting employed. These factors are considered in the following paragraphs.

If the rock ledge is thoroughly shattered by the primary blast, very little secondary blasting may be required. If, however, the primary shot merely fractures the ledge with the production of numerous large solid blocks, much secondary blasting may be needed to reduce the blocks to convenient size. It is evident, therefore, that the extent of secondary blasting is in a large measure dependent upon the efficiency of primary blasting. As pointed out in a previous paragraph, the employment of an expert blaster for primary shots tends to eliminate much of the secondary blasting.

Rock that is schistose in character is usually shattered effectively by the primary blast. Where schistosity is only moderately developed the rock has a tendency to split out in long thin slabs. This is known among quarrymen as "slab cleavage." In most limestone quarries, however, the rock is massive and tends to break into more or less cubical blocks. Such rock is said to possess "cubical cleavage." Where steam-shovel loading is employed, rock having slab cleavage requires less secondary blasting than that with cubical cleavage, for a rock crusher will accommodate a larger

FIRST MARBLE CHURCH IN NEW ZEALAND
Built of White Marble Quarried at Motueka, by the New Zealand Marble Company

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mass in the form of a long thin slab than it will in cubical form. Schistosity, therefore, tends to reduce the necessity for secondary blasting. In some of the schistose cement-rock deposits of the Lehigh District of Pennsylvania, the rock is so thoroughly shattered by the primary blast that little or no secondary blasting is required. Few quarries for the production of blast-furnace flux are of this type as the rock is usually massive in character.

Where vertical open seams are spaced 6 to 8 feet apart there is a tendency for the primary blast to push out large solid masses that require excessive secondary blasting. A method of dealing with such an unfavorable conditions is discussed in detail in a previous publication, in which it is pointed out that at least one of the blast holes for the primary shot should be located in each rock mass between seams, for thereby each mass is shattered. On the other hand any large mass that is not penetrated by a drill hole is simply pushed out. It is evident, therefore, that the amount of secondary blasting required in connection with unsound rock ledges is largely dependent on the skill employed in primary blasting.

The toughness of the rock is also an important factor in this connection. Tough rock with few seams or bed planes tends to break into large cubical masses requiring maximum secondary blasting. The proper method of dealing with such rock can usually be determined only by experience. By varying the diameter, spacing, and burden of primary drill holes, or by varying the amount or grade of the explosive the blast foreman may be able to arrive at a combination that will promote effective shattering and thereby reduce the secondary blasting requirement.

Mr. Bowles then takes up the question of rock loading and describes the labor requirements of hand loading and steam-shovel loading methods. He gives a number of illustrations, showing from practical experience that four or five men, with a steam shovel, can load as much rock as 45 men by hand methods. The transportation of the rock then engages his attention, and he recounts the saving in man power by the utilization of gravity in a number of quarries. A fruitful source of wasted effort is unnecessary rehandling of material, he says. Rock is commonly unloaded and reloaded unnecessarily, or dumped in places that require excessive labor for its subsequent removal. An instance has been observed where a small percentage of a type of rock necessary for plant operation is brought from a distance and mixed with the main supply of rock quarried at the plant. Such rock is carried in hopper-bottom cars, dumped to the bottom of a 40-foot quarry pit, reloaded by hand into carts, hauled by mules to the foot of an incline, and lifted by cable to the crusher. Such excessive rehandling may be due to lack of equipment or to faulty plant design. In time of labor shortage, it is imperative that radical changes be made to remedy such faults.

Mr. Bowles discusses the crushing of the stone at some length, considering both the size and the type of crusher that are best suited for the different kinds of quarries. His final paragraphs have to do with safety measures in relation to labor economy. He sets forth the responsibilities of the operator and the employee, and concludes his remarkably helpful handbook with this statement: "By faulty equipment, by unsanitary surroundings, or by carelessness, the effective personnel of a quarry may be materially reduced through accident or disease. If, on the other hand, the quarry equipment is kept in a safe condition, if healthful surroundings are maintained, and if due watchfulness is exercised in quarry operations, both operators and employees may feel that they are doing their full share in conserving the man power of the nation."

As to a Memorial Arch in New York

For some time the National Sculpture Society has been planning a victory arch in New York, under which returning soldiers and sailors will parade, and an Altar of Liberty, both to stand in Madison Square. The president of the society, Paul Bartlett, has been authorized to take the matter up with the city authorities. With regard to memorials, the *Evening Post* says editorially: "Mayor Hylan, in his message to Deputy Police Commissioner Wanamaker, sounds the first terrible note of the monumentalist. He wants a permanent arch erected somewhere in the city right away to commemorate American soldiers fallen in France. Nothing could be more appropriate than such a memorial in the most prominent square still left untenanted, could we only be sure that a hastily erected affair would be a really fitting memorial. The Maine memorial serves by way of perennial warning. Why commit ourselves to any permanent monument at all, as yet? Let us rather do a little experimenting, as we did with the Washington Arch. The day is not so far off when our boys will return and march up Fifth Avenue. Various temporary structures will be put up to adorn their line of march. Competitions by eminent sculptors might give us, on that occasion, some sample memorials in plaster from which the public could choose. This would approximate the old Russian method; statues of perishable materials were erected, it is said, in public squares of Russian cities on probation, and taken down again if they met with public disapproval. Surely, New Yorkers have had enough of monumental pigs in pokes. It is time they were given an opportunity to see and judge of important memorials, such as this proposed by Mr. Hylan, before being disfranchized by irretrievable stone or bronze."

Mineral Production of South Africa

According to the official figures of the Department of Mines and Industries, the total mineral production of the Union of South Africa for the first six months of 1918 amounted to $99,309,402.

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STONE

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VOLUME XXXIX DECEMBER, 1918 NUMBER 12

A BOSTON man, writing to a New York newspaper, makes a suggestion for a form of punishment to be inflicted upon Germany for her policy of frightfulness and destruction which shall adequately impress her with the fact that that policy has not paid and never will pay. He says that retaliation in kind is open to two main objections; first, it places the Allies somewhat on a level with their foe; secondly, it adds to the already enormous waste of natural resources without any material gain. The writer's suggestion is this: Suppose that, beginning with Berlin and utilizing such other German cities as may be needed, not forgetting the royal palaces, skilled building wreckers tear down all buildings, and the material resulting be transported to devastated territory in France and Belgium, etc., and utilized in reconstruction; that the labor of such reconstruction be done by German soldiers under Allied military control and at Germany's expense. Let not only bricks and stone be removed but machinery, furniture, fittings and utensils, and replace orchards and vineyards as nearly as possible in the same manner. The writer foresees two great objections to the plan; first, that it would be very much more expensive than to rebuild and call upon Germany to repay the expenditures; secondly, that it might be regarded as a practical enslavement of German soldiers during the term of reconstruction. He does not believe, however, that either of these objections would counterbalance the moral effect of this procedure if adopted.

IT is too early as yet for the general resumption of building operations following the signing of armistice terms. But no one can doubt that we are on the verge of one of the greatest periods of building activity this country has ever experienced. There is every reason to justify such a belief. Construction work has been held in abeyance for a year or more, the Federal Government having place an embargo on all building work. Even before this action, building was restricted by necessity, owing to labor shortage and the difficulty of transporting materials of construction. A great growing and wealthy country like the United States cannot shut down on all kinds of building work for more than a year without suffering from it. The war has caused us to create vast new industries, and this has meant a remarkable shifting of population. As a result the housing problem has become acute. We lack public and business buildings, factories, hotels, dwellings and every kind of structure. The Federal Government, as soon as the immediate stress of war was lightened, removed all restrictions, and has directly encouraged building operations. The Government itself lacks post office, custom house and court house facilities, and intends to take up as soon as possible the construction of needed federal buildings. Plans and appropriations have long been available for structures of this kind, and it is announced that fully one hundred such projects will be carried through without delay. This means activity for the stone quarries and contractors. An immediate and general resumption of work is essential if the stone industry is to keep up the organization that has brought it to the forefront of the nation's business enterprises. We must build if we are to hold our place in world progress, and the stone industry will prove itself ready to meet all demands that can be placed upon it.

Duties on Carved Stone

Importers of art work in stone and of antiques have continually filed protests against the customs duty assessed against them. The collectors of revenue seem determined to levy the highest possible tax, without regard to fitness or common sense. A statue by Donatello would almost certainly be classified as a manufacture of marble, instead of as a work of art. The Manchester *Guardian* discusses the problems that will arise if the recommendations of the Luxury Tax Committee are embodied in legislation in England. The paper dwells upon the difficulties of classification encountered in the application of the United States customs regulations. The writer says in part:

"The report raises an infinite number of problems of classification. 'Antiques,' for instance, are to be dutiable whatever their price, but 'furniture, antique or modern,' only when the cost exceeds certain specified sums. In the case of many an article, therefore, much will depend upon whether it is officially regarded as an antique or as a piece of antique furniture.

"This is just the kind of difficulty that has produced constant confusion and perplexity in the operation of the American customs tariff. Importers have strained their ingenuity to find reasons for bringing a particular article under some other category than that in which it has been placed by the customs officers or assessors. A few years ago there was imported a stone slab, dug out from a royal palace at Ninevah, on which had been carved the portrait of a king, accompanied by an in-

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scription in Assyrian characters covering about half the slab. This was at first appraised as a manufacture of limestone liable to a duty of 50 per cent.

"Ultimately the courts sustained the contention of the importer, who insisted that it was a manuscript, and should therefore be admitted free. Under our luxury tax schedules, on the other hand, this slab, if sold in an English auction room, would be free if a manufacture of limestone, but taxable if a manuscript or a curio. What of an Egyptian mummy? A mummy brought into America was first set down by the appraisers as a manufactured article, but presently they changed their minds and declared it to be an anatomical preparation.

"In the report of Mr. Acland's Committee 'pictures, paintings, mosaics, drawings, sculptures, statutory, bronzes, imitation bronzes' are all to be taxed at 2d. on the shilling, whatever the price paid for them. But what is a painting and what is sculpture or statuary? It has been ruled in America that religious paintings done on canvas with aniline colors are not paintings within the meaning of the act, but are manufactures of cotton. Sculpture, again, to be worthy of the name, must either be cut in stone or cast in metal. Gerome's statuette, Bellona, being of ivory and bronze, was excluded from this category. Some carved wooden pieces imported for a Roman Catholic church at Galveston were found to be not church statuary but manufactures of wood. Bas-reliefs are not statuary. It has been decided, too, that the term 'statuary' applies only to the representation of the forms of human beings and animals, and does not cover representations of inanimate things or of conventional or architectural objects."

Duty on Marble Fonts

About 130 cases of marble fonts, made up of a marble basin supported by a pedestal and base, were the subject of a customs controversy decided recently in New York by the Board of United States General Appraisers in favor of the Collector of Customs. In some of the cases there were ten of twenty fonts of the same design, and duty was assessed by the Collector at the rate of 45 per cent. ad valorem under the provision in paragraph 98 of the Tariff Act of 1913 for manufactures of marble. The importer, the Universal Shipping Company, of Chicago, claimed duty under paragraph 376 as works of art, or, in the alternative, free entry under paragraph 652 as original sculptures. Judge Waite, who renders the board's opinion in this case, writes:

"We find nothing in the testimony which would warrant us in holding that the fonts are either original sculptures or first or second replica reproductions. There is no evidence with reference to whether they are made by any mechanical process. Neither is the testimony sufficient to satisfy us that they are made by or under the supervision of a professional sculptor as the professional production of a sculptor only, as defined by the statute, paragraph 652. We are of the opinion that they are dutiable under paragraph 376 under the decisions of the courts construing that statute. Much less are they free under paragraph 652. The protests are therefore overruled."

Cement Released for Monument Foundations

Cement for use in making foundations for monuments is to be released by the War Industries Board, according to an announcement by D. R. McLennan, Chief of the Non-War Construction Board of the War Industries Board at Washington. The embargo placed on the use of cement for foundations for monuments did not affect contracts in force at the time the order was promulgated some weeks ago. The order was comparatively recent, and its full effect had hardly been felt. There is no question that it would have worked a decided hardship to the granite manufacturing industry, and there will be general relief in the granite centers that the War Industries Board has made the new ruling.

Crushed Stone Price Fixed

At a meeting of the Price-fixing Committee held in Washington, November 7, a maximum price of $1.50 per ton (2,000 lbs.) f. o. b. car plant, was fixed for all Government purchases of crushed stone (other than railroad blast or screenings) for the period ending December 31, 1918, within the metropolitan Philadelphia district, i. e., for the State of New Jersey south of and including Trenton; the State of Delaware and the State of Pennsylvania east of and including Harrisburg.

Government Work

The Supervising Architect, Treasury Department, is preparing plans for a $250,000 archive building in Washington.

The Supervising Architect, Treasury Department, is preparing plans for a hygienic laboratory on Twenty-sixth and E streets, Washington, to cost about $250,000.

The Supervising Architect's office has let the contract for alterations to the post office at Binghamton, to A. E. Badgley, of that city, at $26,467.

A Big Contract in Rock Excavating

The Ohio Quarries Company, of Cleveland, has been awarded the contract for excavating about 200,000 cubic yards of sandstone in the Baldwin Reservoir project for the city of Cleveland. The work will take ten months or a year to complete. The company will operate two steam shovels, a locomotive crane, three derricks, two locomotives, twenty-five dump cars and several drills.

Limestone and Sandstone

The Florence A. Roberson Memorial, a model infirmary and hospital, has just been completed at Hightstown, N. J., for Peddie Institute, the famous boys' school. The architecture is Colonial, and the construction of brick and Indiana limestone, fireproof throughout.

One of the Food Administration's recent rulings concerning the use of ground limestone has been construed to exclude its use for agricultural purposes. As a matter of fact, such an interpretation largely defeats the purpose of recommendations made by the agricultural advisory committee and by the Secretary of Agriculture. The use of lime and its relation to crop production is so important in some sections that Rhodes S. Baker, assistant priorities commissioner, has made the following interpretation of the rule in question: "The State official who supervises agricultural production or

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soil conservation—usually the director of the Extension Service of the State Agricultural college—may supervise without direction or permit from the fertilizer division the distribution and use of burned lime and ground limestone for agricultural purposes, and any manufacturer, producer or dealer in burn lime or ground limestone may supply such products for agricultural purposes under such rules and regulations as may be prescribed by such State official. This interpretation does not in any wise modify the distribution of lime for use other than agricultural purposes."

Marble and Granite

The Boston branch of the Granite Cutters' International Association has voted to demand seventy-five cents an hour, the new scale to become effective at once. The men now receive 62½ cents an hour.

The contract for the marble work for the new Palace Theatre, on East Sixth Street, Cincinnati, has been awarded to the Henry Marble Company, of Chicago. The contract for the tile work was awarded to the Cassini Mosaic Company, of Cincinnati.

Judge Mullins, of the District Court, Denver, has issued an order at the instigation of the Bankers' Trust Company, of New York, authorizing J. F. Manning, receiver of the Colorado Yule Marble Company, to issue $14,000 in receiver's certificates to be used in protecting the property against damage, the certificates to take precedence over all other liens than those for taxes. Receiver Manning has filed with the District Court a petition of intervention in the suit brought against the Gunnison County Commissioners and Treasurer by M. S. Radetsky. The petition declares that the machinery, appliances and equipment in place on the quarries of the company cost $2,500,000 and constitute the most expensive and modern marble plant in the world. The plant will be dismantled, thus proving a total loss to the State, it is held, if the sale for $25,000 in back taxes is carried out.

There was recently placed in Park Lawn Cemetery at Bennington, Vt., what is said to have been the largest stone of its kind ever taken from the Barre quarries. This was one of the roof stones for a mausoleum being built for Edward H. Everett. It weighed 48 tons, was 38 feet long, and only 20 inches in thickness. Heavier pieces of granite have been taken from the quarries, but they were in blocks. The extreme length and thinness of this slab made the quarrying and handling a most difficult job.

The marble and granite stock and equipment of the late James S. Clark, at North Bennington, Vt., has been sold to Timothy Hector, of Hoosic Falls, N. Y.

The plant formerly occupied by the Schneider Granite Company, occupying an entire city block in St. Louis, and later leased to the American Car & Foundry Company, has just been sold to B. G. Brinkman, of the Lafayette-South Side Bank, St. Louis.

The Christa Marble Company and the Batchelder Marble Company, of Detroit, announce their consolidation under the firm name of Christa-Batchelder Marble Company. For the present they will continue to operate both plants and will maintain the present offices at 492 Lafayette Boulevard, and 1625 St. Aubin Avenue. At a future date the combined plants will be located at the present plant of the Batchelder Marble Company, which will be enlarged to receive the machinery now in operation at the Christa plant and give Detroit what the demand deserves—a strictly modern plant for handling marble and slate of sufficient capacity to handle the rapidly increasing requirements in these materials.

Emil Seitz, of La Crosse, Wis., has purchased hte business of the Winona Monument Company, of Winona, Minn., which has been conducted for the past eight years by J. C. Franteel.

A new department store and hotel has just been completed at Shanghai, China, for the Wing On Company. The floors are of white terrazzo, with red borders.

Governor Graham, of Vermont, who recently returned from Washington, announced that he had conferred with the War Industries Board with the result that it is probable a modification of the recent ruling will be made so that the granite industry will benefit under the fuel order. It is expected that there will be no necessity for closing down the industry.

The city of Boston recently sold 152,000 or more used granite paving blocks to a contractor for $20 per thousand. The Finance Committee reported to the mayor that the blocks could have been recut and used again, or be sold at $40 to $60 per thousand. For future policy the commission recommends that the method of settlement of this sale be referred to the corporation counsel; that no paving blocks suitable for relaying be sold; that stone cutters and laborers of the Public Works department be employed during the winter to preparing for reuse the 1,000,000 granite blocks already removed from the city streets, and that if, for any reason, any blocks must be sold such action be taken only after public advertisement.

The Campbell Granite Company, of St. Cloud, Minn., has taken over the business of Benzie & Campbell, of that city. John F. Campbell, senior member of the firm, was with the old concern, and he has associated his two nephews, John and Carl Campbell. The young men are sons of William Campbell, of the firm of Simmers & Campbell, St. Cloud.

Business Brevities

The Missouri Refractories Company was about to take over the $150,000 plant of the Banner Clay Works at Edwardsville, Ill., but the combination to the vault in the Edwardsville office is lost and the abstract to the property and some other papers considered necessary in perfecting the deal which has been closed, are in the vault. Everybody who knew the combination has forgotten it, and the single slip which contained the numbers has disappeared. The owners of the safe are unwilling to blow it open.

The value of building permits issued by Vancouver City Building Department for the month of August was approximately $250,000. This is an increase of about four times the total for the same period last year, when the value for August was $54,424.

Within the near future the City of Vancouver will have to spend nearly a million dollars to replace old plank roads with more permanent material, according to the thirteenth report of the city engineer, recently submitted to the city council. The actual cost of replacing the wooden roads with rock in six wards of the city at the present price of materials is given at $982,847.50.

The Hershey Gravel Company, of Evart, Mich., has increased its capital stock from $40,000 to $100,000.

The Ohio Buff Sandstone Company, of Cleveland, has increased its capital stock from $100,000 to $150,000.

A truck, belonging to the Minneapolis Stone Company, crashed through the railing of a bridge in that city, and fell 35 feet to the roadway below. The driver escaped fatal injuries.

The Porterfield & Brown Monument Works, at Greenfield, Ia., were burned recently, with a loss of about $35,000.

The James H. Young Stone Company has sold the northerly half of the block at 136th Street and Walnut Avenue, New York, to Robert Grant, a steel man.

The Sterling Stone Sawing Company, of New York, has filed a notice of dissolution.

Messrs. Warfield & Hoffman and C. O. Williamson, of Lincoln, Ill., dealers in stone, sand, gravel, etc., and con-

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tractors for road building, have combined under the firm name of Hoffman & Williamson.

The production of building materials and road metal in Burmah in 1917 had a value of $347,627. This is a slight increase over the output in 1915 and 1916. The figures represent the actual value of the product at the point of production.

The James H. Young Stone Company's plant at 136th Street and the East River, New York, has been sold to Milliken Brothers Manufacturing Company, Inc. It will be used as a plant for the manufacture of structural steel, radio towers, etc.

Big Programme for Post Office Construction

With the lifting of the general embargo on building, the Federal Government will resume the construction of public buildings, held in abeyance for many months. The lack of post office accommodations has been keenly felt, and plans and appropriations have long been waiting. The Supervising Architect, Treasury Department, Washington, D. C., will receive bids for the construction of post offices at the cities named, until the following dates, the amount of the available funds being given:

January 3, Newburyport, Mass., $70,000; Mt. Carmel, Ill., $155,000; Park City, Utah, $23,000.

January 6, Caribou, Me., $50,000; Lancaster, S. C., $42,000; Bakersfield, Cal., $135,000.

January 7, Woodbury, N. J., $55,000; Fremont, O., $100,000.

January 8, Waterloo, N. Y., $55,000; Cody, Wyo., $50,000; Prescott, Ariz., $50,000.

January 9, State College, Pa., $60,000; Orange, Tex., $55,000.

January 10, Vineland, N. J., $60,000; Front Royal, Va., $42,000.

January 13, West Point, Ga., $44,000.

January 14, McKees Rock, Pa., $65,500; Cherokee, Ia., $58,000.

January 15, Long Island City, N. Y., $160,000; Kenton, O., $66,000; Bellefouche, S. D., $70,500.

January 16, Winchester, Mass., $55,500; Eldorado, Kans., $55.000; Shawnee, Okla., $117,000.

January 17, Cohoes, N. Y., $81,500; Franklin, Pa., $81,000; Buffalo, Wyo., $62,500.

January 20, Sunbury, Pa., $100,000; Decatur, Ala., $58,500; Harrisonville, Mo., $47,500.

Bids will be received by the Supervising Architect for the construction of post offices and court houses as follows: Until January 7, at Alexandria, La., $65,000; January 9, Durango, Col., $100,000; January 13, Globe, Ariz., $100,000.

Bids will be received by the Supervising Architect until January 13, for the construction of a post office and custom house at Ft. Fairfield, Me., $62,000.

It is understood that the immediate construction of about one hundred post offices is in contemplation, and that bids for the remainder will soon be called for.

Fixing Iron Railings in Stone Coping

In answer to an inquiry as to the best method of fixing iron railings in stone coping, an English technical paper gives the following directions: Molten lead is generally used for this purpose; it makes good, strong fixing. The objections are that, when in contact with the iron, it sets up some kind of galvanic action, and has a tendency after a few years to eat the rails away at the base, just where it enters the stone. Sulphur in the form of stone brimstone, when melted and run in the holes, forms a secure fixing, and is free from the above objections. To use this, provide a thick iron pot, break up the brimstone into small pieces, and place sufficient in the pan, mixed with fine sand or powdered brick. Then heat on a fire that has burnt into a red-hot mass without flame, for it is very difficult to prevent the brimstone taking fire if there is a flame playing round the pan, and once afire it is almost impossible to quench it. Spence's metal was also thought much of some years ago, but the writer is not certain whether this is now obtainable; this material also made good fixing, and there was no oxidation. A mason's one-inch chisel and point would be all the tools that are absolutely necessary to form the holes.

New Companies

The Southern Mining & Gravel Company, of Birmingham, Ala., to quarry and deal in stone, gravel, etc. Capital $2,000. President and treasurer, T. H. Spencer; vice-president, S. A. Spencer; secretary, Lee Cotten.

Norco Marble Company, of Cleveland, O., to manufacture and deal in marble, etc. Capital $300,000. Incorporators: H. M. Owen, C. A. Mustee, F. M. Zeh, M. M. Rich and C. L. Giersch.

The Tecumseh Sand Company, of Philadelphia, to deal in sand, stone, etc. Capital $50,000. Treasurer, Robert L. Worsing, 1303 North American Building, Philadelphia.

The Capital Monument Company, of Savannah, Ga., to manufacture and deal in marble and granite. Capital $10,000. Incorporators: Cecil W. Brannen and J. M. Thayer, Savannah, and S. C. Latham, Statesboro.

United States Decorative Marble Company, Inc., of Wilmington, Del., to manufacture and deal in cement, lime, limestone, and all kinds of plasters. Capital $500,000.

The Waterloo Tile & Marble Company, of Waterloo, Ia., to manufacture and deal in marble, tile, etc. Capital $10,000. President, A. R. Harlbut; secretary, L. R. Bales.

The Columbus Sand & Gravel Company, of Columbus, O., to deal in sand, stone, gravel, etc. Capital $20,000. Incorporators: W. H. Jones, Karl T. Webber, R. W. McCoy, W. E. Callahan and William F. Kern.

The Central Monument Company, Chicago, to manufacture and deal in marble and granite. Capital $2,500. Incorporators: Fred F. March, F. Kelly, William A. Omelvana.

Construction Notes

The Order of Eagles will build a $150,000 Club House on Illinois Street, Chicago Heights, after plans by P. Gerhardt, 64 West Randolph Street, Chicago.

The Agricultural and Mechanical College of Texas, will erect an administration and a physics building at College Station, the two buildings to cost about $175,000.

The New York Board of Education has had plans prepared for a four-story limestone and terra cotta school at 151st Street and Crotona Avenue. The plans are by C. B. J. Snyder, 500 Park Avenue.

The Boston Store, Grand Avenue, Milwaukee, will erect a $500,000 addition to its building.

Bergen County will build a $250,000 hospital at Oradell, N. J., after plans by W. Austin and G. Conable, 46 West Twenty-fourth Street, New York.

St. Louis is planning the erection of a $2,000,000 convention hall, and a $150,000 hospital.

Bethlehem, Pa., has voted a $866,000 bond issue for the purchase of sites and erection of school buildings.

Hannaford & Sons, Cincinnati, have prepared plans for Hoffman School, on Woodburn Avenue, in that city, to cost $200,000.

Foundations are going in for a $5,000,000 steel rolling mill for the Dominion Iron & Steel Corporation at Sydney, N. S. The contract for the steel work is held by the Dominion

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Bridge Company, Ltd., of Montreal, and for the machinery by the United Engineering Company, of Pittsburgh.

The Y. M. H. A., of Philadelphia, is planning to raise $1,000,000 for the erection of a club house and communal center.

New Orleans will receive bids in January for the erection of a trade school on City Park Avenue. The plans are by City Architect E. A. Christy.

Mankato, Minn., is to erect a $100,000 school, after plans by G. Pass & Sons, of that city.

H. F. Holt, Kansas City, has prepared plans for a chapel and children's building for the House of the Good Shepherd, in that city.

Fairot & Livandais, New Orleans, are preparing plans for an 18-story banking and office building on Carondelet and Gravier streets, in that city, to cost about $2,000,000 for the Hibernia Bank & Trust Company.

The Dominican Sisters, of Grand Rapids, Mich., have had plans prepared by E. Brielmaier & Sons, Milwaukee, for a $250,000 convent in the latter city.

St. James' Anglican congregation of Dundas, Ont., contemplate the erection of a new church.

The contract for the tile, marble and slate work in the new technical school which is to be erected at Three Rivers, Que., has been awarded to Hamon & Hess, Montreal.

The Canadian Bank of Commerce, Toronto, has purchased a site for a branch bank building at Moncton, N. B.

The Canadian Iron Foundries, Ltd., will build a $75,000 extension to its plant at Three Rivers, Que.

The contract for the erection of additional hospital buildings at Fort Benjamin Harrison, Ind., expected to cost about $3,000,000, has been awarded to the Bedford Stone & Construction Company, of Indianapolis and Bedford.

Loew's Palace Theatre, at Thirteenth and F streets, Northwest, Washington, has just been completed. The lobby is finished in Italian marble and travertine.

A Handbook for Wire Rope Users

It would be impossible to crowd into equal space a greater amount of invaluable information for all users of wire rope than is found in the latest catalogue of the Waterbury Company, New York. This is a little cloth bound volume only 3½ by 6 inches, but it has 212 pages and these contain about every possible fact, hint and suggestion that one could desire to know about wire rope, armored rope, fibreclad rope, music wire, manila rope, sisal rope and drilling cables. It is fully illustrated and describes the characteristics, methods of construction and use of all the different varieties of ropes. It gives the correct practice in the use of wire rope, how it should be measured, coiled, lubricated and preserved, and tells what varieties are best suited for special work. Directions are given for splicing, and there are many tables, showing the relative effects of various sized sheaves or drums on the life of wire rope, the comparative strength of wire and manila rope, etc. In fact, there is scarcely a single problem arising in the use of wire rope that will not be found adequately covered in this little hand-book. Quarries and stone yards have constant dependence upon wire rope and the catalogue should be in every stone man's possession. A copy can be had for the asking.

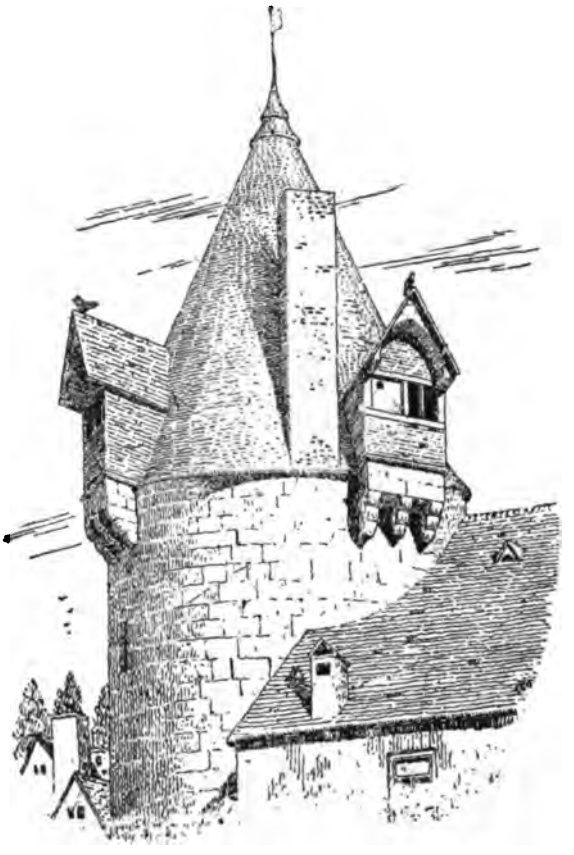
Obituary Notes

Ernst A. Pacius, mill superintendent of the Andres Stone & Marble Company, of Milwaukee, died at his home in that city the past month, after an illness of several weeks. Mr. Pacius was born in New York in 1852, and had been connected with the Andres company for more than thirty years.

Basilio Barquin, a member of the Central Granite Company, of Barre, and a well-known granite manufacturer of that city, died the past month of pneumonia, following influenza. Mr. Barquin was born in Santander, Spain, thirty-seven years ago, and had been a resident of Barre for almost twenty years.

Charles Kress, who was engaged in the marble business with his father, Adolph Kress, at Tomah, Wis., died the past month.

Patrick J. Burke, founder of the Burke Monument Company, of Washington Court House, O., is dead at the age of 76 years. He was born in Ireland but came to this country in early boyhood.



TOWER AT ORLEANS, FRANCE
From a sketch by the late J. Tavenor Perry, in the London *Architect*

Business Embarrassments

A trustee in bankruptcy has been appointed for George G. Oman and John Oman, Jr., engaged in the stone business at Nashville, Tenn.

The New York courts have confirmed a composition of William Buess, Inc., manufacturers of marble and slate, Nos. 312-316 East Ninety-fifth Street, New York, with creditors at 25 cents on the dollar cash.

Gustavus C. Wege begun suit for the appointment of a receiver for the F. E. Gates Marble & Tile Company, of Indianapolis. A plea in abatement was filed by the defendant and a demurrer filed by the plaintiff. An exhibit, filed with the plea, shows the financial condition of the company with assets of more than $3,000 in excess of liabilities.

On application of C. E. Richards, who says he holds a judgment of $3,942.14 against the Ohio Gravel & Sand Company, of Columbus, O., R. I. Bartlett has been appointed receiver of the concern.

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NOT only are they far superior to any other kind of vault in resisting the action of water and earth, but they **never sag.**

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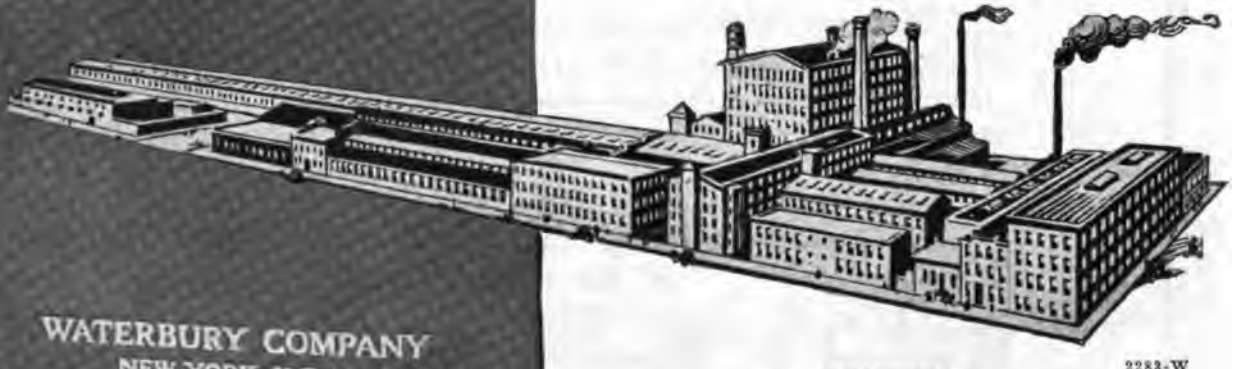

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The saw has a 60 inch blade designed to run at 850 R. P. M., with a rim motion of 1,300 feet. It is operated by one 15 and one 3 H. P. motor, A. C. or D. C. It is equipped with silent chain drive, with metal guard. The saw has a range of cutting feeds from 2 to 14 inches per minute, and can instantly be changed from minimum to maximum by simply moving a lever and without stopping the saw.

The machine has an automatic feed release. It will throw out its own feed after finish of cut and feed will then stop. This feature makes it fool-proof, as the operator can disregard the machine and it can do itself no damage.

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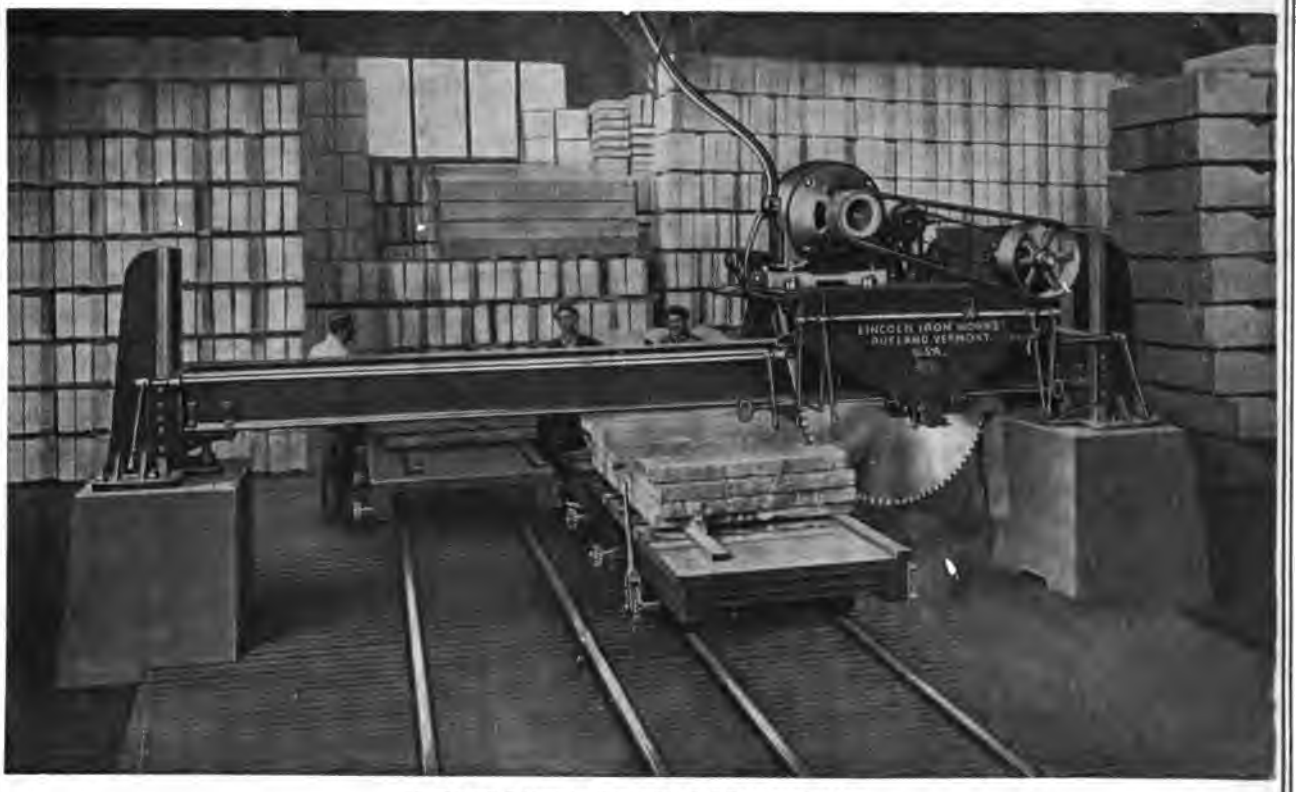

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Cut illustrates saw in operation in one of the largest stone finishing plants in the Bedford, Ind., district. The up-to-date **Diamond Saw** of merit, unequalled for simplicity and efficiency. All motions independent of each other and accomplished with a single motor. The operator has absolute control in any position. Built in all sizes and for all the various kinds of stone. Can be furnished with either diamond, splint AAA or carborundum teeth.

Stone Planing Machines furnished in all sizes. **All Lincoln Planers** are driven by the famous **Sellers Spiral Gears,** because this drive is better and more efficient than the worm drive.

Thomson Patent Circular Planing Attachment has no equal and can be applied to any type of planer. It takes care of any radius and the manufacture is controlled exclusively by us.

The Latest Improved Lincoln Screw Gang Saw has a number of new "Patent Applied For" features which appeal to the sawyer and make it the best gang saw ever built.

Lincoln Gang fitted with the **Thomson Parallel Motion Attachment** is the best and fastest cutting gang for granite and all the other building stones. It is built exclusively by us and makes the very best proposition for a **Diamond Gang.**

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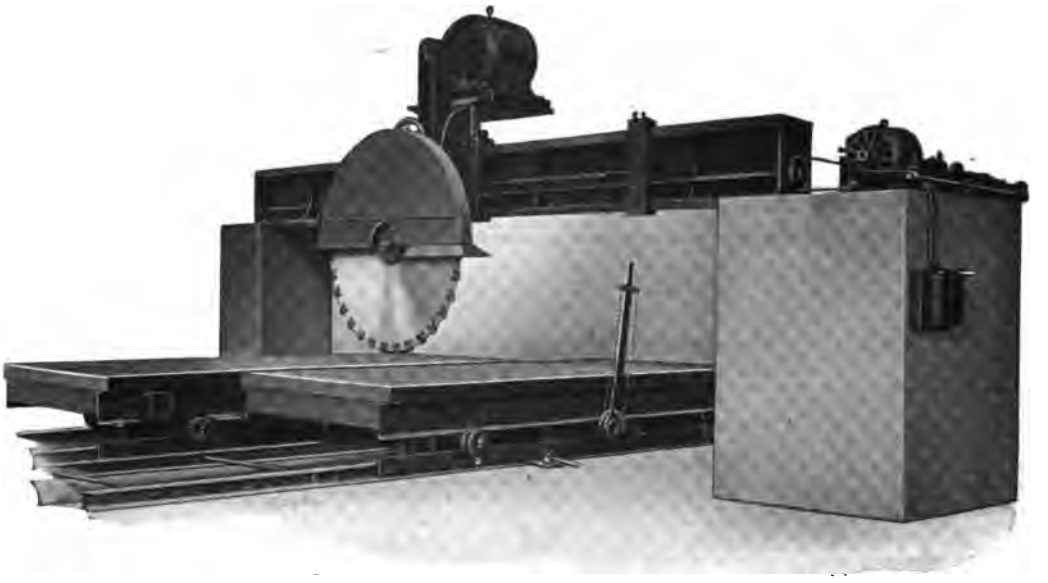

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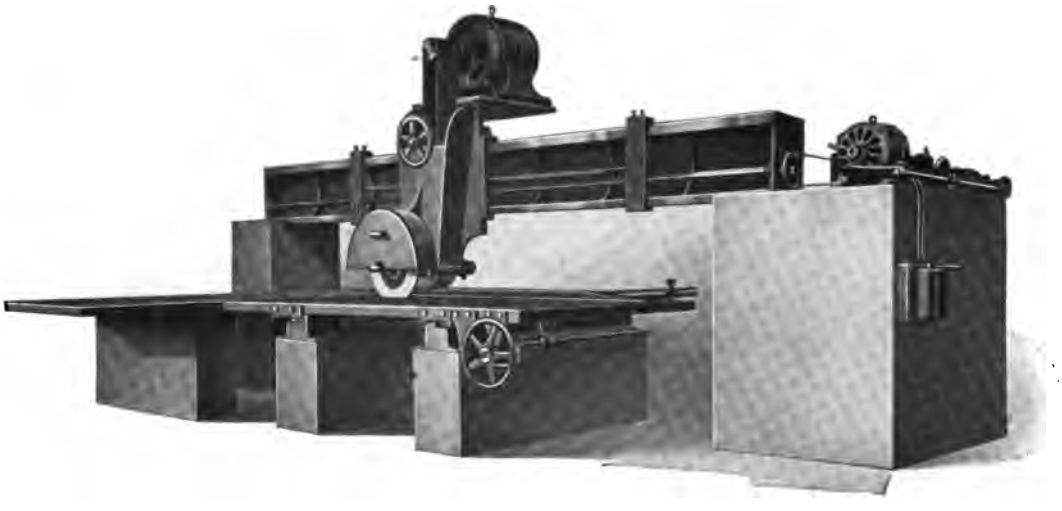

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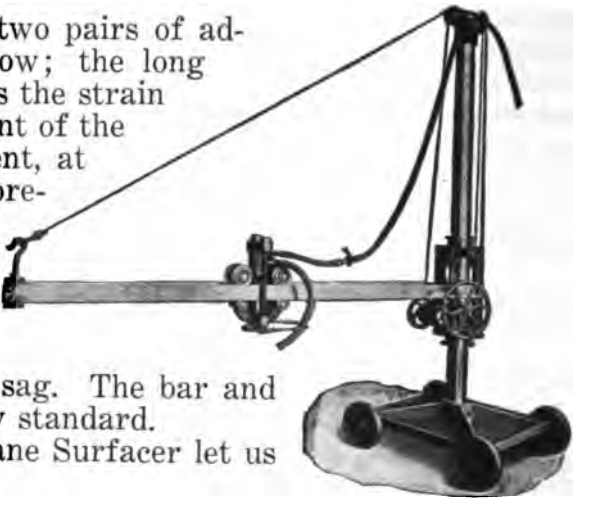

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GRANITE: The same process to be used except that finely seived Granite powder is to be added.

STONE: The arrises are to be well dampened; for patching use half the quantity of Stone powder with the cement. FOR COLORING CEMENTED PARTS, use mineral colors of the tint required.

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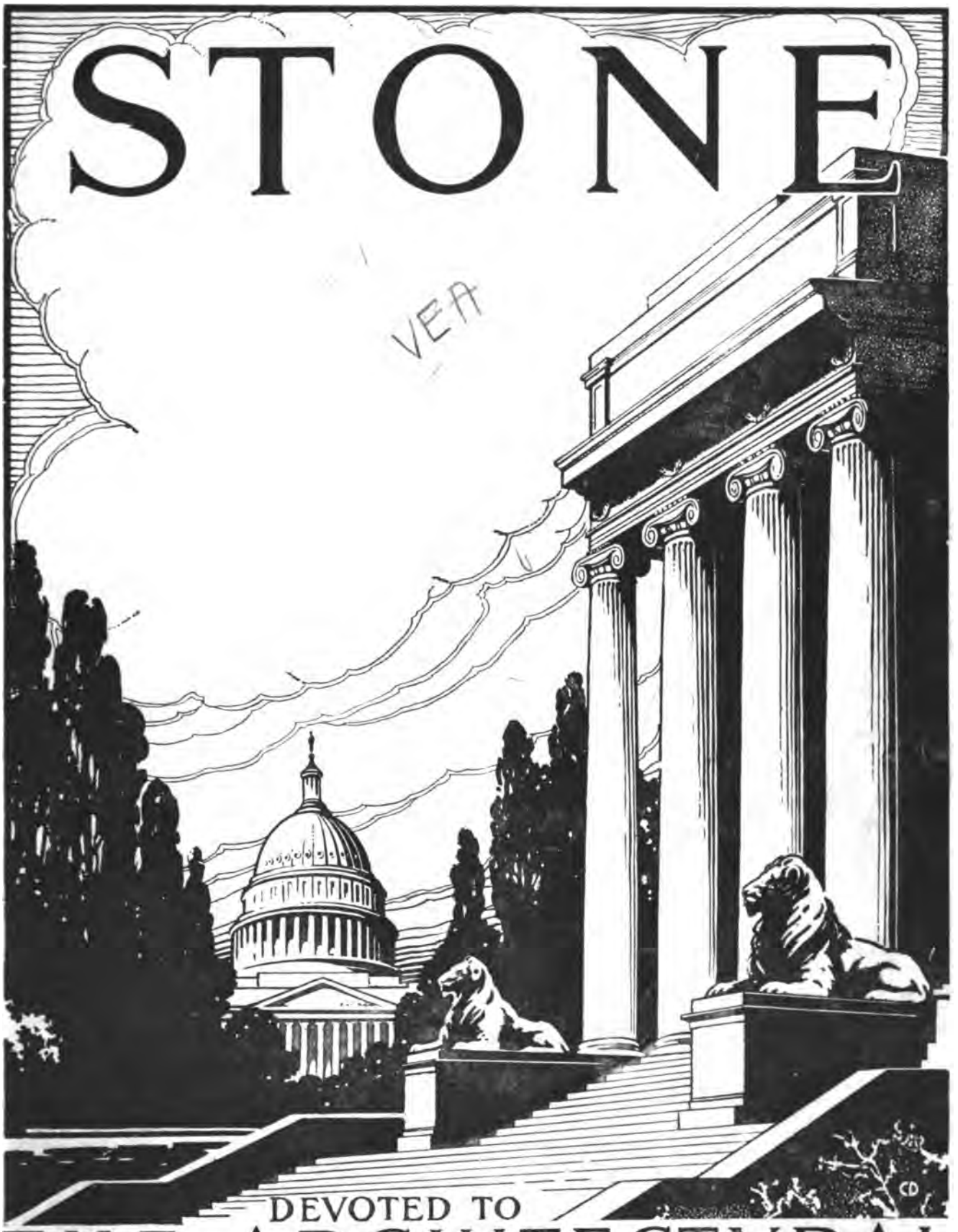

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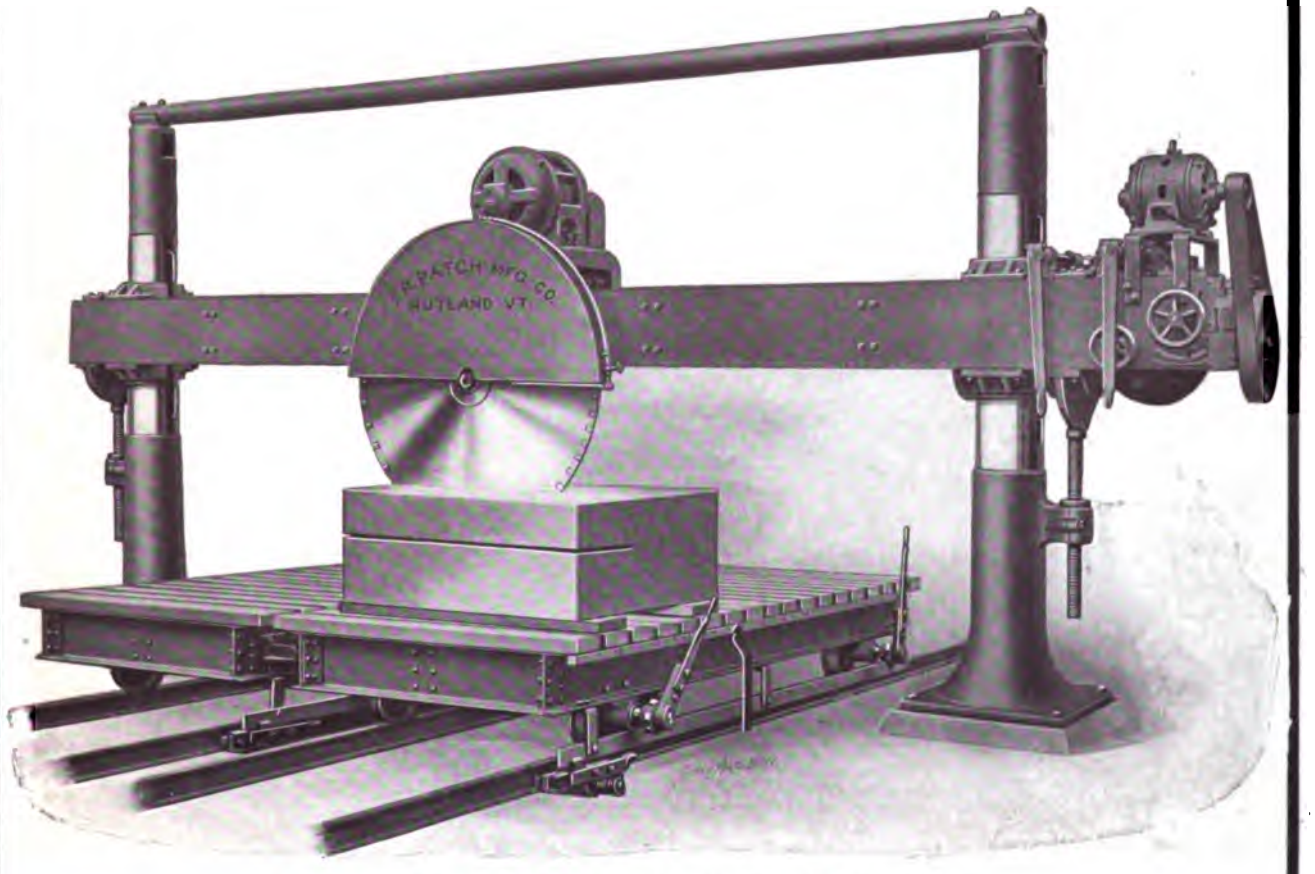

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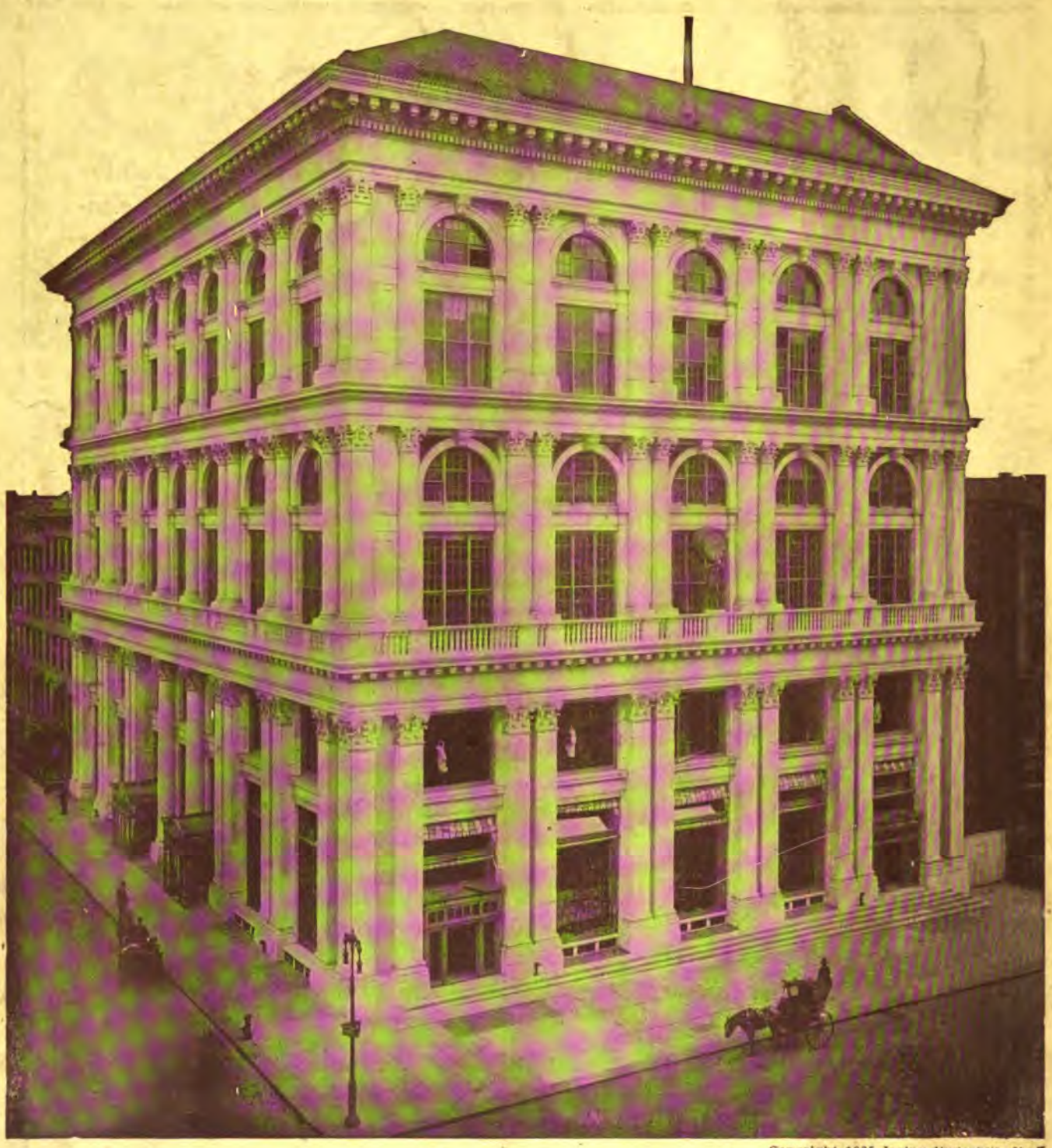

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